

Alternatives

Appendices

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APPENDIX A ECOSYSTEM RESTORATION PROGRAM PLAN PROGRAMMATIC ACTIONS

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ECOSYSTEM RESTORATION PROGRAM

PLAN

PROGRAMMATIC ACTIONS

Tables of ERPP actions are shown on the following pages for each of the 14 ecological zones:

- Sacramento-San Joaquin Delta
- Suisun Marsh and North San Francisco Bay
- Sacramento River
- North Sacramento Valley
- Cottonwood Creek
- Colusa Basin
- Butte Basin
- Feather River/Sutter Basin
- American River Basin
- Yolo Basin
- Eastside Delta Tributaries
- San Joaquin River
- East San Joaquin Basin
- West San Joaquin Basin

Each table is organized to show the target and the programmatic actions for each resource element.

Target: A target is a qualitative or quantitative statement of an implementation objective. Targets are something to strive for but may change over the life of the program with new information and progress, or may vary according to the configuration of storage and conveyance in the preferred alternative. Targets may include a range of values or a narrative description of the proposed future value of an ecosystem element. Targets are to be set based upon realistic expectations, must be balanced against other resource needs and must be reasonable, affordable, cost effective, and practicably achievable.

These targets can represent programmatic actions. A programmatic action represents a physical, operational, legal, institutional change or alternative means to achieve a target. The number of actions and their level of implementation is subject to adjustment by adaptive management. For example, the number of diversions screened may be adjusted up or down depending on the overall response of fish populations to screening and other restoration actions.

SACRAMENTO-SAN JOAQUIN DELTA ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Stream flow		General Target: More closely emulate the natural (unimpaired) seasonal Delta outflow pattern that transports sediments, stimulates the estuary food web, provides for up- and down-stream fish passage, contributes to riparian vegetation succession, transports larval fish to the entrapment zone, maintains the entrapment zone and natural salinity gradient, supports favorable striped bass spawning conditions, and provides adequate attraction and migrating flows for salmon, steelhead, American shad, white and green sturgeon, striped bass, splittail, delta smelt, and longfin smelt. Besides seasonal peak flows, low and varying flows are also essential elements of the natural Delta outflow pattern to which native plant and animal species have adapted. Specific targets for different attributes of the flow pattern, including magnitude and duration, may vary with the different storage and conveyance alternatives being considered by the CALFED program.	
		1. Provide a March outflow pulse that occurs from the natural late winter - early spring peak in inflow from the Sacramento River. The outflow pulse should be at least 20,000 cfs for 10 days in dry years, at least 30,000 cfs for 10 days in below normal year types, and 40,000 cfs for 10 days in above normal water year types. Wet year outflow pulses are generally adequate under the present level of development.	1. Prescribed outflows in March should be met by the cumulative flows of prescribed pulse flows for the Sacramento River, Feather River, and American River. It will be necessary to obtain assurances (e.g. limit Delta diversions) that these prescribed flows will be allowed to contribute to Delta outflow. The pulse inflow would be provided in part by pulses prescribed for the Sacramento River and its tributaries (Feather, Yuba, and American). The remainder of the inflow would be from base (minimum) flows from the east Delta tributaries and the San Joaquin River and its tributaries.

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Targets and Actions

Resource Element	Location	Target	Actions
		2. Provide a late April - early May outflow pulse that emulates the spring inflow from the San Joaquin River. The outflow pulse should be at least 20,000 cfs for 10 days in dry years, 30,000 cfs in below normal years, and 40,000 cfs in above normal years.	1. Prescribed outflows in late April and early May should be met by the cumulative flows of prescribed pulse flows from the Stanislaus, Tuolumne, and Merced Rivers (see San Joaquin East-Side Tributaries Ecological Zone), and Mokelumne and Calaveras river (see East Delta Tributaries Ecological Zone). It will be necessary to obtain assurances that these prescribed flows will be allowed to contribute to Delta outflow. The pulse would be made up of base flows from the Sacramento River, its tributaries, and the Cosumnes River, plus Mokelumne, Calaveras, and San Joaquin tributary pulse flows prescribed under the May 1995 Water Quality Control Plan, and by CALFED for these rivers.
		3. Provide a fall or early winter outflow pulse that emulates the first pulse of "winter" rain through the Delta.	1. Allow the first "significant" natural pulse of flow into the Delta (most likely from rainfall from unimpaired flows from tributaries and lower watersheds below storage reservoirs, and from flows recommended by DFG and AFRP) to pass through the Delta to the Bay by limiting water diversions from the Delta for up to 10 days. (No supplementary release of stored water from reservoirs would be required above that required to meet DFG and AFRP prescribed flows.)
		4. Provide a minimum flow of 13,000 cfs on the Sacramento River below Sacramento in May in all but critical years (AFRP 1995).	1. Supplement flows in May in all but critical years as needed from Shasta, Oroville, and Folsom reservoirs to maintain 13,000 cfs inflow to Delta.

SACRAMENTO-SAN JOAQUIN DELTA ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		5. Ensure net flow through the lower San Joaquin River channel at the mouth of Old River, generally referred to as QWEST, has a net positive 14-day running average from February 1 through April 30. If monitoring indicates that adult delta smelt are present in the San Joaquin River or its tributary sloughs through March, then the following 30-day average inflows at Vernalis should be provided from April 1 to May 15: 2,400 cfs in critical years; 2,600 cfs in dry years; 3,200 cfs in below normal years; 3,600 cfs in above normal years; and 5,200 cfs in wet years. These flows requirements would supersede San Joaquin River base and pulse flows prescribed under the 1995 WQCP, but not the pulsed flows prescribed by CALFED for the East Delta Tributaries and East San Joaquin Tributaries Ecological Zones.	1. Increase Delta inflow or limit water exports from the Delta to meet this target.
Delta Channel Hydraulics		General Target: Reestablish more natural internal Delta hydraulics in channels not designated to carry cross-Delta flow of water to south Delta pumping plants.	<p>1. Reduce flows in selected Delta channels by increasing cross-sectional areas of channel via set-back levees or providing constrictions to flows into or out of channels to reduce flow through channel.</p> <p>2. Restore 3,000 to 4,000 acres to tidal perennial aquatic habitat and 20,000 to 25,000 acres of tidally influenced freshwater marsh.</p> <p>3. Restrict tidal flow and cross-Delta transfer of water to south Delta pumping plants to selected channels to lessen flow through other channels.</p> <p>4. Manage the operation of existing physical barriers so that resulting hydraulics upstream and downstream of the barrier are more similar to mid-1960s levels.</p> <p>5. Close the Delta Cross Channel (DCC) when opportunities allow as specified in the 1995 WQCP and recommended by USFWS (AFRP 1995) in the November through January period when appropriate conditions trigger closure (Internal Delta exports are occurring).</p>

SACRAMENTO-SAN JOAQUIN DELTA ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		1. Maintain net downstream flows in the mainstem San Joaquin River from Vernalis to immediately west of Stockton during the September through November period to help sustain suitable dissolved oxygen levels sufficient for upstream migrating adult fall-run chinook salmon.	1. Operate a fully operational barrier at the head of Old River in the period August through November.
		2. Restore 50 to 100 miles of tidal channels in the southern Yolo Bypass within the North Delta Unit, while maintaining or improving the flood carrying capacity of the Yolo Bypass.	1. Construct a network of channels within the Yolo Bypass that connect Putah and Cache Creek sinks, and potentially the Colusa Drain to the Delta. Channels should effectively drain all flooded lands in the Bypass after flood flows cease entering the Bypass from Freemont and Sacramento Weirs. 2. Reduce flow constrictions in Yolo Bypass such as openings in railway causeway that parallels Interstate 80.
Water temperature		General Target: More frequently achieve mean daily water temperatures between 6°F and 65°F in the Delta channels in spring and fall consistent with temperature needs for salmon and steelhead migrating through or rearing in the Delta.	1. Improve riparian woodland habitats along migrating channels and sloughs of the Delta. 2. Improve shaded riverine aquatic habitat along migration routes in Delta.

SACRAMENTO-SAN JOAQUIN DELTA ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Floodplain Inundation and Sediment Retention		General Target: Expand the floodplain area in the North, East, South, and Central and Western Delta ecological units by incorporating approximately 10 percent of leveed lands into the active floodplain of the Delta.	<p>1. Convert leveed lands to tidal marsh/slough complexes in the North Delta Unit. Permanently convert island tracts (Little Holland, Liberty, and Prospect) at the south end of the Yolo Bypass to tidal wetlands/slough complexes. Convert small tracts along Snoggrass Slough to tidal wetland/slough complexes. Set back levees along Minor, Steamboat, Oxford, and Elk sloughs.</p> <p>2. In the East Delta Unit, set back levees along the South Mokelumne River and connecting dead end sloughs (Beaver, Hog, and Sycamore).</p> <p>3. Convert deeper subsided lands between dead-end sloughs in the East Delta unit east of the South Mokelumne River channel to overflow basins and non-tidal wetlands or agricultural use.</p> <p>4. Remove levees that inhibit tidal and flood flows in the headwater basins of East Delta dead-end sloughs (Beaver, Hog, and Sycamore) and allow these lands to be subject to flood overflow and tidal action.</p> <p>5. Set back levees in the South Delta Unit along the San Joaquin River between Mossdale and Stockton.</p>
			<p>6. Convert adjacent lands along the San Joaquin River between Mossdale and Stockton to overflow basins and non-tidal wetlands or agricultural use.</p> <p>7. Set back levees on corners of Delta islands along the San Joaquin River channel in the Central and Western Delta Unit.</p>

SACRAMENTO-SAN JOAQUIN DELTA ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Food Web		General Target: Increase primary and secondary productivity levels in the Delta to levels historically observed in the 1960's and early 1970's.	1. Actions described above to restore stream flow, floodplain inundation, Delta hydraulics, tidal wetlands and sloughs, and riparian habitat would increase primary and secondary productivity in the Delta. Relocating the intake of the south Delta pumping plants to the North Delta would also increase Delta productivity.
Levees and Bank Protection		General Target: Increase shoreline and floodplain riparian habitat in the Delta by modifying current vegetation maintenance practices on water side and land side berms on 25 to 75 miles of the Sacramento, Mokelumne, and San Joaquin rivers, and on 25 to 100 miles of other Delta channels and sloughs confined by levees.	1. Enter into agreements with willing levee reclamation districts to implement modified levee and berm vegetation management practices that promote establishment and maturation of shoreline riparian vegetation in order to restore and maintain the health of aquatic resources in and dependent on the Delta. Reimburse districts for any additional maintenance and inspections costs.
Dredging		1. Limit dredging in channel zones that are not essential for flood conveyance or maintenance of industrial shipping pathways, and avoid dredging activities in shallow water areas (< 3 m MHW) except where it is needed to restore flood conveyance capacity.	1. Use alternate sources of levee maintenance material, rather than in-Delta channel sources, such as excavation of abandoned non-essential levees, excavation material from the restoration of secondary tidal channels, dry-side island interior borrow pits, upland borrow sites, Cache Creek Settling Basin and Yolo Bypass sediment deposits, and deep-water dredging sites in the Bay. 2. Restrict or minimize effects of dredging activities near existing mid-channel tule islands and shoals that are vulnerable to erosion and exhibit clear signs of area reduction in response to channel and bar incision.
		2. Avoid spawning and rearing periods for delta smelt and rearing period for winter-run chinook salmon.	1. Follow Department of Fish and Game guidelines for dredging in the estuary. 2. Provide stockpiles of levee maintenance materials in three or more selected landside areas to avoid the need to obtain material from Delta channels during restricted periods.

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Targets and Actions

Resource Element	Location	Target	Actions
Exotic Species		1. Manage existing and restored dead-end and open-end sloughs and channels within the Delta Ecological Zone so that less than 1 percent of the surface area of these sloughs and channels are covered by invasive exotic aquatic plants	1. Conduct large-scale, annual weed eradication programs throughout existing and restored dead-end and open-end sloughs and channels within each of the Delta's Ecological Units so that less than 1 percent of the surface area of these sloughs and channels are covered by invasive exotic aquatic plants within ten years.
		2. Reduce the aerial extent of invasive non-native woody species, such as Giant Reed (aka Arundo or False Bamboo) and eucalyptus, that compete with native riparian vegetation by reducing the aerial extent of exotics by 50 percent Delta-wide, and eradicating invasive woody plants from restoration areas.	1. Implement a program that is Delta-wide to remove and suppress the spread of invasive non-native plants that compete with native riparian vegetation by reducing the aerial extent of species such as False Bamboo and eucalyptus, by 50 percent. 2. Implement a program that is Delta-wide which, prior to taking restoration actions, eliminates invasive woody plants that could interfere with the restoration of native riparian vegetation.
		3. Reduce or eliminate the influx of exotic aquatic species in ship ballast water.	1. Fund additional inspection staff to enforce existing regulations. 2. Help fund research on ballast water treatment techniques which could eliminate exotic species before ballast water is released.
		4. Reduce the potential for influx of exotic aquatic plant and animal species at border crossings.	1. Provide funding to the Calif. Dept. of Food and Agriculture to expand or establish as appropriate a comprehensive program of exclusion, detection, and management of invasive aquatic species such as the zebra mussel, purple loosestrife, and hydrilla.
Predators		General Target: Reduce predation on juvenile fish in Clifton Court forebay.	1. Remove predatory fish from Clifton Court forebay.

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Targets and Actions

Resource Element	Location	Target	Actions
Unscreened and Poorly Screened Diversions		General Target: Reduce loss of important fish at diversions.	<ol style="list-style-type: none"> 1. Consolidate and screen agricultural diversions in the Delta. 2. Replace and/or upgrade the screens at the SWP and CVP intakes with positive barrier, fish bypass screens and state-of-the-art fish holding and transportation systems. 3. Upgrade screens at PG&E Contra Costa power plant with fine-mesh, positive barrier, fish bypass screens.
Contaminants		General Target: Reduce loading, concentrations, and bioaccumulation of contaminants of concern to ecosystem health in the water, sediments, and tissues of fish and wildlife in the Delta Ecological Zone by 25 to 50 percent as measured against current average levels.	<ol style="list-style-type: none"> 1. Reduce the input of herbicides, pesticides, fumigants, and other agents toxic to fish and wildlife in the Delta by modifying land management practices and chemical dependency on 50,000 acres of urban and agricultural lands that drain untreated into Delta channels and sloughs. Actions will focus on modifying agricultural practices and urban land uses on a large scale basis to reduce the concentration of pesticide residues, using a combination of reducing the pesticide load by reducing the amount applied and reducing the amount reaching the Delta's aquatic habitats by taking advantage of biological and chemical processes within wetland systems which can help to break down harmful pesticide residues. 2. Reduce levels of hydrocarbons and other contaminants entering the Delta food web from elevated releases into the estuary at oil refineries.

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Targets and Actions

Resource Element	Location	Target	Actions
Boat Wake Erosion		1. Reduce boat traffic and boat speeds in areas where levees or channel islands and their associated shallow water and riparian habitat are susceptible to wake damage and in areas with continued boat use in order to protect important Delta habitats such as berm islands from boat wake induced erosion.	1. In the Central and West Delta Ecological Unit, establish and enforce no wake zones in 1-3 miles in Disappointment Slough, 1-2 miles in White Slough, and 3-4 miles in Middle and Old rivers in areas with remnant berms and mid-channel islands. 2. In the East Delta Ecological Unit, establish and enforce no wake zones in 1-3 miles of the Mokelumne River, 2-4 miles in Snodgrass Slough, and 3-4 miles in Beaver, Hog, and Sycamore sloughs in areas with remnant berms and mid-channel islands.
		2. Reduce boat wakes near designated important California black rail nesting areas in the Delta from March to June to levels necessary to prevent destruction of nests to assist in recovery of this listed species.	1. Establish and enforce no wake zones within 50 yards of important California black rail nesting areas in the Delta from March to June. 2. Establish and enforce no motorized boating zones in 5 to 25 miles of existing dead-end channels in the Delta from March to June. 3. Establish and enforce no motorized boating zones in the small tidal channels created in restored tidal fresh emergent wetlands and Delta floodplains of levee setbacks.
Illegal and Legal Harvest of Fish and Wildlife		General Target: Reduce illegal harvest of anadromous fish and waterfowl in the Delta percent by increasing enforcement effort.	1. Provide additional funding to the Department of Fish and Game for additional enforcement. 2. Provide additional funding to the local county sheriff's departments and state and local park agencies to support additional enforcement efforts. 3. Provide rewards for the arrest and conviction of poachers of fish and wildlife.

SACRAMENTO-SAN JOAQUIN DELTA ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Shallow Water Habitat		1. Restore 1,500 acres of shallow-water habitat in the North Delta Ecological Unit; 1,000 acres of shallow-water habitat in the East Delta Ecological Unit; 2,000 acres of shallow-water habitat in the South Delta Ecological Unit; and, 2,500 acres of shallow-water habitat in the Central and West Delta Ecological Unit.	<p>1. Restore 500 acres of shallow-water habitat at Prospect Island in the North Delta Ecological Unit.</p> <p>2. Restore 1,000 acres of shallow-water habitat in the downstream (south) end of the Yolo Bypass within the North Delta Ecological Unit.</p> <p>3. Restore 1,000 acres of shallow-water habitat at the eastern edge of the East Delta Ecological Unit where existing land elevations are between -5 and -9 feet mean sea level.</p> <p>4. Restore 2,000 acres of shallow-water habitat at the south and eastern edge of the South Delta Ecological Unit where existing land elevations are between -5 and -9 feet mean sea level.</p> <p>5. Restore 2,500 acres of shallow-water habitat in the Central and West Delta Ecological Unit where existing land elevations are between -5 and -9 feet mean sea level. A program of fill placement or longer term subsidence reversal may be needed to accomplish this action.</p>
		2. Restore 500 acres of shoals in the western-most portion of the Central and West Delta.	Implement a sediment management program which results in deposition and accretion within portions of Central and West Delta channels and bays, forming 500 acres of shallow shoal habitat restored to tidal influence.

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Targets and Actions

Resource Element	Location	Target	Actions
Non-tidal Perennial Aquatic Habitat		1. Develop 500 acres of deep open-water areas (greater than 4-6 feet deep) within restored fresh emergent wetland habitats in the Delta to provide resting habitat for waterbirds, foraging habitat for diving ducks and other waterbirds and semi-aquatic mammals that feed in deep water, and habitat for associated resident pond fish species.	1. Develop 100 acres of deeper open-water areas within restored fresh emergent wetland habitats in the West and Central Delta Ecological Unit such as on Twitchell or Sherman islands. 2. Develop 200 acres of deeper open-water areas within restored fresh emergent wetland habitats in the East Delta Ecological Unit. 3. Develop 200 acres of deeper open-water areas within restored fresh emergent wetland habitats in the South Delta Ecological Unit.
		2. Develop 1,500 to 2,000 acres of shallow, open-water areas (less than 4-6 feet deep) in restored fresh emergent wetland habitat areas in the Delta to provide resting, foraging, and brood habitat for waterbirds and habitat for fish and aquatic plants and Semi-aquatic animals.	1. Develop 500 acres of shallow, open-water areas within restored fresh emergent wetland habitats in the Central and West Delta Ecological Unit such as on Twitchell or Sherman islands. 2. Develop 300 acres of shallow, open-water areas within restored fresh emergent wetland habitats in the East Delta Ecological Unit. 3. Develop 300 acres of shallow, open-water areas within restored fresh emergent wetland habitats in the South Delta Ecological Unit. 4. Develop 1,000 acres of shallow, open-water areas within restored fresh emergent wetland habitats in the North Delta Ecological Unit.

SACRAMENTO-SAN JOAQUIN DELTA ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Tidal Slough Habitat		General Target: Restore ecological structure and functions of the Delta waterways network by increasing the land-water interface ratio a minimum of 50 to 75 percent compared to 1906 conditions, and by restoring 100 to 150 miles of small distributary sloughs (less than 50 to 75 feet wide) hydrologically connected to larger existing Delta channels.	<p>1. In order to replace lost slough habitat and provide high-quality habitat areas for fish and associated wildlife in the near term, restore 20 miles of slough habitat, and in the long-term 50 miles in the Central and West Delta Ecological Unit; in the near term, restore 10 miles, and in the long-term 30 miles, of slough habitat in both the North Delta and East Delta ecological units; and, in the near term, restore 25 miles, and in the long-term 50 miles, of slough habitat in the South Delta Ecological Unit.</p> <p>2. Restore tidal action to portions of islands and tracts in the North and East Delta ecological units with appropriate elevation, topography, and hydrogeomorphic conditions to sustain tidally influenced freshwater emergent wetland with 20 to 30 linear miles of narrow, serpentine shaped sloughs within the wetlands and floodplain. The restored configuration should result in a land-water interface ratio between 7 and 10 to optimize shallow shoreline perimeter and ecological functions.</p>

SACRAMENTO-SAN JOAQUIN DELTA ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Seasonal Wetland habitat		General Target: Restore and manage at least 4,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the North Delta Ecological Unit; restore and manage at least 6,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the East Delta Ecological Unit; restore and manage at least 8,000 acres of additional seasonal wetland habitat and improve management of 1,500 acres of existing, degraded seasonal wetland habitat in the Central and West Delta Ecological Unit; restore and manage at least 12,000 acres of additional seasonal wetland habitat and improve management of 500 acres of existing, degraded seasonal wetland habitat in the South Delta Ecological Unit.	<ol style="list-style-type: none"> 1. Improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the Yolo Bypass. 2. Restore and manage 2,000 acres of additional seasonal wetland habitat in association with the Yolo Bypass Wildlife Area. 3. Restore and manage 1,000 acres of additional seasonal wetland habitat on Canal Ranch. 4. Restore and manage 4,000 acres of additional seasonal wetland habitat on both Twitchell and Sherman islands. 5. Restore and manage an additional 20,000 to 30,000 acres of seasonal wetland habitat throughout all Delta ecological units. (Wetlands can be developed on lands designated for flood plain expansion).

SACRAMENTO-SAN JOAQUIN DELTA ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Riparian Scrub Habitat		General Target: Restore 10 to 20 linear miles along the San Joaquin River, in the South Delta Ecological Unit to create corridors of riparian vegetation of which 50 percent is greater than 75 ft wide with 40 percent no less than 300 ft in width and one mile in length; and, restore 15 to 25 linear miles along other Delta island levees throughout the Delta Ecological Unit to create corridors of riparian vegetation of which 60 percent is greater than 75 ft wide with 10 percent no less than 300 ft in width and one mile in length.	<ol style="list-style-type: none"> 1. Obtain conservation easements or purchase from willing sellers land needed to restore 10 to 15 linear miles of riparian habitat along the Sacramento River in the North Delta Ecological Unit. Obtain conservation easements or purchase from willing sellers land needed to e corridors of riparian vegetation of which 60 percent is greater than 75 ft wide with 25 percent no less than 300 ft in width and one mile in length 2. Obtain conservation easements or purchase from willing sellers land needed to restore 5 to 10 linear miles along the Mokelumne River and 3 to 5 miles along the Cosumnes River in the East Delta Ecological Unit to create corridors of riparian vegetation of which 75 percent is greater than 75 ft wide with 25 percent no less than 300 ft in width and one mile in length 3. Obtain conservation easements or purchase from willing sellers land needed to restore riparian habitat along newly-created sloughs and sloughs with new levee setbacks. 4. Obtain conservation easements or purchase from willing sellers land needed to restore riparian habitat along new or upgraded Delta levees.
Riparian Woodlands		General Target: Protect existing riparian woodlands in North, East, and South Delta Units.	<ol style="list-style-type: none"> 1. Expand the Stone Lakes and Cosumnes River Preserves from their current size by an additional 500 acres of existing woodland habitat. Cost share with the Nature Conservancy to acquire in-fee the lands needed from willing landowners. 2. Purchase riparian woodland property or easements.

SACRAMENTO-SAN JOAQUIN DELTA ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Tidal Emergent Wetland Habitat		General Target: Increase existing tidal emergent wetland habitat in the Delta by restoring 30,000 to 45,000 acres of lands designated for flood plain restoration.	<ol style="list-style-type: none"> 1. Develop tidal wetlands on Prospect, Little Holland, and Liberty island-tracts in the North Delta. 2. Develop tidal wetlands on small tracts of converted leveed lands along Snodgrass Slough. 3. Develop tidal wetlands along the upper ends of dead end sloughs in the East Delta. 4. Develop tidal wetlands along all setback levees and levees with restored riparian habitat.
Non-Tidal Emergent Wetland Habitat		General Target: Restore 1,000 acres of non-tidal fresh emergent wetland in each of the North and East Delta Ecological Zones; restore 4,000 acres of non-tidal fresh emergent wetland in the South Delta Ecological Zone as part of a subsidence control program; and, restore 10,000 acres of non-tidal fresh emergent wetland in the Central and West Delta Ecological Zone as part of a subsidence control program.	<ol style="list-style-type: none"> 1. Restore 1,000 acres of non-tidal fresh emergent wetland on Twitchell Island. 2. Restore 1,000 acres of non-tidal emergent wetland in the Yolo Bypass. 3. Restore 1,000 acres of non-tidal emergent wetlands in leveed lands designated for flood plain overflow adjacent to the dead-end sloughs in the East Delta Unit. 4. Restore 4,000 acres of non-tidal emergent wetlands in the south Delta in lands designated for flood plain overflow. 5. Restore 10,000 acres of non-tidal wetlands on deeper Delta Islands of the Central and Western Delta Unit.
Mid-channel Islands		General Target. Maintain existing channel islands and restore 50 to 200 acres of high value islands in selected sloughs and channels in each of the Delta's ecological units.	<ol style="list-style-type: none"> 1. Actively protect and improve existing channel islands in the Delta.

SUISUN MARSH AND NORTH SAN FRANCISCO BAY ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
<i>Freshwater inflow</i>		1. More closely emulate the natural seasonal freshwater inflow pattern to North San Francisco Bay to transport sediments, allow up and downstream fish passage, contribute to riparian vegetation succession, allow for the transport of larval fish to the entrapment zone, maintain the entrapment zone in Suisun Bay, and provide adequate attraction flows for upstream, through-Bay migrating salmon. Delta outflow in dry and normal years would be improved by coordinating releases and natural flows in the Sacramento River Basin to provide a March outflow pulse of approximately at least 20,000 cfs for 10 days in dry years, at least 30,000 cfs for 10 days in below normal years, and 40,000 cfs for 10 days in above normal water year types. An existing smaller late April-early May pulse of water should be improved with additional releases of water from San Joaquin and Delta tributaries to provide pulses of similar magnitudes and durations as those prescribed for March.	1. Develop a cooperative program to provide target flows in dry and normal years by allowing major storage reservoir inflows as prescribed in upstream Ecozone visions to pass downstream into and through the Delta. (Note this action would result from an accumulation of recommendations for spring pulse flows and minimum flows from upstream ecological zones.)
<i>Exotic Species</i>		1. Manage existing and restored dead-end and open-end sloughs and channels within the zone so that less than 1 percent of the surface area of these sloughs and channels is covered by invasive exotic aquatic plants	1. Conduct large-scale, annual weed eradication programs throughout existing and restored dead-end and open-end sloughs and channels within each of the Ecological Units so that less than 1 percent of the surface area of these sloughs and channels is covered by invasive exotic aquatic plants within ten years.
		1. Reduce the aerial extent of invasive non-native woody species, such as Giant Reed (aka Arundo or False Bamboo) and eucalyptus, that compete with native riparian vegetation by reducing the aerial extent of exotics by 50 percent, and eradicating invasive woody plants from restoration areas.	1. Develop a cooperative program to remove and suppress the spread of invasive non-native plants that compete with native riparian vegetation by reducing the aerial extent of species such as False Bamboo and eucalyptus, by 50 percent. 2. Develop a cooperative program eliminate invasive woody plants from restoration sites to protect native riparian vegetation.

SUISUN MARSH AND NORTH SAN FRANCISCO BAY ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		1. Reduce or eliminate the influx of exotic aquatic species in ship ballast water.	1. Develop a cooperative approach to fund additional inspection staff to enforce existing regulations. 2. Help fund research on ballast water treatment techniques which could eliminate exotic species before ballast : water is released.
		1. Reduce the potential for influx of exotic aquatic plant and animal species at border crossings.	1. Provide funding to the Calif. Dept. of Food and Agriculture to expand or establish as appropriate a comprehensive program of exclusion, detection, and management of invasive aquatic species such as the zebra mussel, purple loosestrife, and hydrilla.
<i>Unscreened Diversions</i>		1. Reduce entrainment losses of juvenile fish at agricultural, power plant, and managed wetland diversions by 25 to 50 percent by installing positive barrier fish screens on the larger diversions.	1. Develop a cooperative program to evaluate consolidating, screening, or eliminating diversions onto managed agricultural lands in the Suisun Marsh and San Francisco Bay Ecological Zone. 2. Conduct a feasibility study and pilot program to replace and/or upgrade the screens at the SWP and CVP intakes with positive barrier, fish bypass screens and state-of-the-art fish holding and transportation systems. 3. Develop a cooperative approach to evaluating upgrading screens at PG&E Pittsburg power plant with fine-mesh, positive barrier screens.
<i>Contaminants</i>		1. Reduce the input of herbicides, pesticides, fumigants, and other agents toxic to fish and wildlife in the Suisun Marsh and San Francisco Bay.	1. Support existing programs in place to regulate the discharge of pollutants or to reduce pollutant toxicity in Bay waters

SUISUN MARSH AND NORTH SAN FRANCISCO BAY ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
<i>Human Disturbance</i>		<p>1. Reduce boat wakes near California clapper and black rail nesting areas in the Suisun Marsh and San Francisco Bay from March to June to levels necessary to prevent destruction of nests to assist in recovery of this listed species.</p>	<p>1. Develop a cooperative program with local agencies to establish and enforce no wake zones within 50 yards of California black rail nesting areas in the Suisun Marsh and San Francisco Bay from March to June.</p> <p>2. Develop a cooperative program with local agencies to establish and enforce no motorized boating zones in 5 miles of existing dead-end channels in the Suisun Marsh and San Francisco Bay from March to June.</p> <p>3. Develop a cooperative program with local agencies to establish and enforce no motorized boating zones in the new, small channels in the restored tidal fresh emergent wetlands.</p>
<i>Harvest of fish and wildlife</i>		<p>1. Reduce illegal harvest of anadromous fish and waterfowl in the Suisun Marsh and San Francisco Bay by increasing interdiction rate.</p>	<p>1. Provide additional funding to the Department of Fish and Game for additional enforcement.</p> <p>2. Provide additional funding to the local county sheriff's departments and state and local park agencies to support additional enforcement efforts.</p> <p>3. Provide funding for rewards for the arrest and conviction of poachers.</p>
<i>Artificial production of fish</i>		<p>1. Limit supplementation of striped bass to life stages that minimize the rate of predation on juvenile anadromous and estuarine fish.</p>	<p>1. Provide sufficient equipment, support staff, and operation and maintenance funds to hold juvenile striped bass longer so they can be planted at two years of age instead of one year of age.</p> <p>2. Cooperatively develop an ecologically sound basis for limiting stocking of striped bass and chinook salmon in the Bay to areas and time windows that would not increase predation rates on special status species such as longfin smelt and delta smelt, and other native fishes.</p>

SUISUN MARSH AND NORTH SAN FRANCISCO BAY ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
<i>Tidal perennial aquatic</i>		1. Restore 1,500 acres of shallow-water habitat in the Suisun Marsh/Bay Unit; and 1,000 acres of shallow-water habitat in the San Pablo Bay Unit;	1. Develop a cooperative program to acquire and restore 1,500 acres of shallow-water habitat in the Suisun Marsh/Bay Unit. 2. Develop a cooperative program to acquire and restore 1,000 acres of shallow-water habitat in the San Pablo Bay Unit.
<i>Non-tidal perennial aquatic</i>		1. Develop 500 acres of deeper (3-6 feet) open-water areas within restored fresh emergent wetland habitats to provide resting habitat for waterbirds, foraging habitat for diving ducks and other waterbirds that feed in deep water, and habitat for associated resident fish species.	1. Develop a cooperative program to acquire and develop 100 acres of deeper open-water areas within restored saline emergent wetland habitats in the Suisun Marsh/Bay Unit 2. Develop a cooperative program to acquire and develop 200 acres each of deeper open-water areas within restored saline emergent wetland habitats in Sonoma River and Petaluma River units.
<i>Tidal sloughs</i>		1. Restore slough habitat for fish and associated wildlife. In the near term, restore 5 miles, and in the long-term 10 miles, of slough habitat in the Suisun Marsh/Bay Unit; in the near term, restore 10 miles, and in the long-term 20 miles, of slough habitat each in the San Pablo Bay, Napa River, Sonoma Creek, and Petaluma River units.	1. In association with wetland-marsh restoration construct sloughs within the marsh/slough complexes through land acquisition and easement purchase.

SUISUN MARSH AND NORTH SAN FRANCISCO BAY ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
<i>Seasonal wetlands</i>		<p>1. Restore and manage a total of 3,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the Suisun Marsh/Bay Unit. Restore and manage a total of 2,000 acres of additional seasonal wetland habitat and improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the San Pablo Bay Ecological Unit.</p>	<p>1. Develop a cooperative program to improve management of 1,000 acres of existing, degraded seasonal wetland habitat in the northwestern portion of the Suisun Marshlands and Bay Ecological Unit.</p> <p>2. Develop a cooperative program to restore and manage a total of 2,000 acres of additional seasonal wetland habitat in association with the northern portion of the Suisun Marshlands and Bay Ecological Unit. Lands would be purchased from willing sellers or conservation easements.</p> <p>3. Develop a cooperative program to restore and manage a total of 2,000 acres of additional seasonal wetland habitat along the San Pablo Bay Ecological Unit. Lands would be purchased from willing sellers or conservation easements.</p>
		<p>2. Protect and manage vernal pools in the Suisun Marsh/Bay Unit that provide suitable habitat for listed fairy shrimp species, the Delta green ground beetle, and special status plant species to assist in the recovery of these species; and, where feasible, restore vernal pools which have been degraded by agricultural activities to provide suitable habitat for special status invertebrates and plants and amphibian such as the spadefoot toad to assist in the recovery of these populations.</p>	<p>1. Develop a cooperative program to acquire 500 to 1,000 acres of vernal pools and adjacent buffer in order to restore a corridor with the size of the Jepson Prairie Ecological Preserve in the North Delta Ecological Unit.</p>
<i>Riparian/shaded riverine aquatic</i>		<p>1. Restore 10 to 15 linear miles of riparian habitat along corridors of riparian scrub-shrub vegetation of which 60 percent is greater than 15m wide with 25 percent no less than 5 m in width and one mile in length in each of the ecological units</p>	<p>1. Coordinate with landowners and managers to restore and maintain 10 to 15 linear miles of riparian habitat along corridors of riparian scrub-shrub vegetation of which 60 percent is greater than 15m wide with 25 percent no less than 5 m in width and one mile in length in each of the ecological units.</p>

SUISUN MARSH AND NORTH SAN FRANCISCO BAY ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
<i>Saline emergent wetland</i>		1. Restore tidal action to 5,000 to 7,000 acres in the Suisun Marshlands and Bay Ecological Unit; Restore tidal action to 1,000 to 2,000 acres in the Napa River Ecological Unit; Restore tidal action to 500 to 1,000 acres in the Sonoma Creek Ecological Unit; Restore tidal action to 500 to 1,000 acres in the Petaluma River Ecological Unit; Restore tidal action to 500 to 1,000 acres in the San Pablo Bay Ecological Unit	1. Develop a cooperative program to acquire in-fee or through a conservation easement the lands needed for tidal restoration and complete the needed steps to restore the wetlands to tidal action.
<i>Perennial grassland</i>		1. Restore 1,000 acres of perennial grasses in each of the Suisun Marsh and North Bay ecological units associated with existing or proposed wetlands.	1. Develop a cooperative program to acquire in-fee or through conservation easement the acreage needed to achieve target. Take the needed steps to restore suitable habitat.

Sacramento River Ecological Zone

Targets and Actions

Resource Element	Location	Target	Actions
Streamflow		1. More closely emulate the seasonal streamflow patterns in dry and normal year types by allowing a late winter or early spring flow event of approximately 5,000-10,000 cfs in dry years and 15,000-20,000 cfs in normal water years to occur below Keswick Dam.	1. Provide a pulsed flow by supplementing normal operating flows from Shasta and Keswick dams with releases from Lake Shasta (and Trinity Lake) in March of years when no pulse flow has occurred during the winter or is expected to occur. Pulsed flows would only be provided when sufficient inflow to Lake Shasta is available to sustain the prescribed releases. Refinement of this action can be made by evaluating its indirect costs and the overall effectiveness of achieving objectives.
		2. Maintain base flows in the fall between 6,000 to 8,000 cfs.	1. Provide flow releases from Shasta Lake and Keswick Dam when necessary to provide the target base flows. Releases would only be made when inflows equal or exceed prescribed releases.
Stream Meander Belts		1. Preserve and improve the existing stream meander belt in the Sacramento River between Red Bluff and Chico Landing by purchase in fee or through easements of 8-12,000 acres of riparian lands in the meander zone.	1. Remove rip-rap from banks to the extent possible consistent with flood control requirements and reduce effects of other structures such as bridges that inhibit meander process. 2. Purchase easements to offset losses to property owners for land lost to meander process.
Gravel Recruitment		1. Increase gravel recruitment in the upper Sacramento River between Keswick Dam and the Red Bluff Diversion Dam by 10-20,000 cubic yards annually in order to provide adequate spawning habitat for targeted levels of salmon and steelhead, and to sustain stream meander processes below Red Bluff. This is the estimated amount of spawning-sized gravel annually captured by Shasta Dam.	1. Develop a cooperative program to stockpile gravel at strategic locations along the Sacramento River below Keswick Dam where river flow will move gravel into the river channel to mimic natural gravel recruitment into the upper river. Determine the adequacy of this action and adjust amount and locations as necessary. 2. Develop a cooperative program to reactivate gravel recruitment to the river by exposing existing sources of river gravel on islands, bars, and banks that have become armored to river flows. This action should be implemented on a conservative basis because the availability of such in-channel gravel, costs of activating the gravel, indirect impacts, and potential effectiveness have not been determined

Sacramento River Ecological Zone

Targets and Actions

Resource Element	Location	Target	Actions
Water Quality		1. Maintain mean daily water temperatures at levels suitable for maintenance of all life history stages of chinook salmon and steelhead in the Sacramento River between Keswick Dam and Red Bluff Diversion Dam.	1. Cooperatively develop and implement a balanced river regulation program that provides sufficient carryover storage at Shasta Dam to ensure suitably cool water temperatures are available to protect chinook salmon spawning, incubating eggs, and young fish.
		2. Reduce losses of fish and wildlife due to pesticide, hydrocarbon, heavy metal, and other pollutant sources in the Sacramento River.	<p>1. Develop a cooperative program to remedy heavy metal pollution from Iron Mountain Mine to meet Basin Plan standards and implement reliable and proven remedies that ensure continued treatment and control of heavy metal waste prior to discharge to the Sacramento River.</p> <p>2. Develop a cooperative program to eliminate scouring of toxic metal-laden sediments in the Spring Creek and Keswick reservoirs.</p> <p>3. Control contaminant input to the Sacramento River system by constructing and operating stormwater treatment facilities and implementing industrial Best Management Practices for stormwater and erosion control.</p> <p>4. Develop a cooperative program to assess and monitor contaminant input from agricultural drainages in the Sacramento River watershed.</p>

Sacramento River Ecological Zone

Targets and Actions

Resource Element	Location	Target	Actions
Shaded Riverine Aquatic Habitat		1. Provide conditions for growth of riparian vegetation along channelized portions of the Sacramento River.	<p>1. Develop a cooperative program to plant vegetation on un-vegetated rip-rapped banks consistent with flood control requirements. Because the technical feasibility and cost-effectiveness of such actions will need to be determined, pilot projects will be conducted as experiments. Further implementation will be subject to adaptive management and depend on results of these experiments.</p> <p>2. Programmatic Action 1b: Setback levees may be constructed on leveed reaches of the river to provide a wider flood plain and greater development of SRA habitat. Because of the potential indirect impacts to land use and uncertainty as to cost and technical feasibility of setback levees, such development will be experimental and conservative, and dependent on adaptive management.</p>
		2. Increase the ecological value of low- to moderate-quality shaded riverine aquatic habitat through land use and land management changes.	<p>1. Purchase property or easements and allow habitat to improve naturally. Properties to be considered should be developed through priority process based on quality and importance of habitat, technical feasibility and cost of purchase and improvement, and consensus of stakeholders.</p> <p>2. Provide incentives and technical support for private landowners to protect and improve existing SRA habitat.</p>
		3. Maintain existing streamside riparian vegetation.	<p>1. Through purchase, conservation easement, and voluntary participation of landowners, protect SRA habitat from development. Where high-priority properties are already in government ownership or available for purchase or easement, preservation efforts should be undertaken as experiments to develop technical details, cost-effectiveness, and overall approach and consensus for the program. Full implementation of this program would depend on results of experiments and subject to adaptive management.</p>

Sacramento River Ecological Zone Targets and Actions

Resource Element	Location	Target	Actions
Unscreened and Poorly Screened Diversions		<p>1. Reduce entrainment of juvenile salmon and steelhead into water diversions to levels which will not impair stock rebuilding. Emphasis should be on the upper river from Keswick Dam downstream to Chico Landing.</p>	<p>1. Develop a cooperative program to screen all diversions greater than 250 cfs and one- to two-thirds of all smaller unscreened diversions. This programmatic level-of-action should be sufficient to provide the data necessary to modify this target through adaptive management. Determination of which diversions need be screened will be determined upon appropriate monitoring and evaluation, with decisions made with agency and stakeholder involvement, and with consideration given to appropriate alternatives. Actions will be taken on a case-by-case basis with consideration given to results of pilot experiments to determine technical feasibility and cost effectiveness of screening diversions of different size, type, and location. Priorities will be given to screening diversions that pose the most threat and where screening has been determined to be cost effective.</p> <p>2. Develop a cooperative program to upgrade screening at diversions with ineffective screening. Where existing screening has proven less than effective and entrainment problems continue, immediate action should be taken to upgrade screens.</p> <p>3. Develop a cooperative program to reduce diversions during periods when and locations where juvenile salmon are present in large or significant numbers. Even with screens, some diversions may pose a threat to young salmon and steelhead, and it may be necessary to modify operations of the diversion. Such determinations will be made after necessary monitoring and evaluation, and on a case-by-case basis, with decisions made with agency and stakeholder involvement, and with consideration given to appropriate alternatives.</p>

Sacramento River Ecological Zone

Targets and Actions

Resource Element	Location	Target	Actions
Legal and Illegal Harvest of Fish		1. Reduce illegal harvest of fish species to a minimum in order to maintain or increase populations by increasing enforcement efforts 50 to 100%.	<p>1. Provide increased enforcement efforts.</p> <p>2. Develop a cooperative program to educate the public on the threats to populations from illegal harvest. Various actions include ad campaigns, signs along streams, and various types of out-reach programs to schools and groups.</p> <p>3. Provide additional funding for the poaching hotline and rewards for arrest and convictions of poachers.</p>
		2. Manage the legal harvest of chinook salmon, steelhead, and sturgeon by shifting harvest from natural stocks to hatchery stocks where possible or reducing harvest of wild stocks until the naturally produced populations recover.	<p>1. Develop a cooperative program to mark all hatchery salmon and steelhead, thereby allowing selective harvest of hatchery fish, while limiting harvest of wild fish. This action should be implemented on a short-term and experimental basis to ensure it meets its objective and is cost effective.</p> <p>2. Encourage regulatory agencies to change fishing regulations (i.e. by restricting seasons, limits, and gear, and reducing harvest of wild fish) to further reduce legal harvest and any ancillary effects of fishing gear or techniques. Restrictions should be severe in short term. Long-term restrictions would depend on response of populations and effectiveness of restrictions, and the degree of effectiveness of the action.</p>
Diversion Dams - Fish Passage and Predators		1. Reduce the adverse effects of predatory fish by identifying and eliminating human-made instream structures or operational conditions that allow unnatural rates of predation.	1. Selectively evaluate areas and make physical changes to structures in the Sacramento River such as bridge abutments, diversion dams, and water intakes that currently may attract predators and provide them with additional advantages in preying upon juvenile salmon and steelhead. There is a need for pilot studies and evaluations to determine the types of changes required and the potential degree of implementation
		2. Reduce blockage to fish migrations at Anderson-Cottonwood Irrigation District Dam and Red Bluff Diversion Dam.	1. Upgrade fish passage facilities at the Anderson-Cottonwood Irrigation District dam and Red Bluff Diversion Dam.

Sacramento River Ecological Zone

Targets and Actions

Resource Element	Location	Target	Actions
Artificial Production of Fish		1. Minimize the likelihood that hatchery reared salmon and steelhead in the upper Sacramento River will stray into non-natal streams in order to protect naturally produced salmon and steelhead.	1. Develop a cooperative program to evaluate the benefits of limiting stocking of hatchery reared salmon and steelhead in upper Sacramento River. Stocking may be reduced in years when natural production is high in selected populations.
		2. Limit hatchery stocking to populations that cannot be sustained through natural production.	1. Augment winter-run, spring-run, and late-fall run chinook salmon and steelhead with hatchery produced smolts during the short-term rebuilding phase of restoration efforts and only when alternative measures are deemed insufficient to provide recovery of the populations. Stocking of hatchery reared fish will be undertaken as experiments and adjusted or terminated as necessary depending on results.
		3. Employ methods to limit straying and loss of genetic integrity of wild and hatchery supported stocks.	1. Rear hatchery salmon and steelhead in hatcheries on natal streams to limit straying. If hatchery augmentation of Sacramento River populations of salmon and steelhead is necessary, then hatcheries should be built on the Sacramento River for that purpose. 2. Limit stocking of salmon and steelhead fry and smolts to natal watersheds to minimize straying that may compromise the genetic integrity of naturally producing populations.

Sacramento River Ecological Zone

Targets and Actions

Resource Element	Location	Target	Actions
		4. Minimize further threats of hatchery fish contaminating "wild" stocks of salmon and steelhead.	<p>1. Where hatchery production is underway and continues, methods should be adopted and improved for the selection of an appropriate cross-section of the adult population for spawners for the hatchery.</p> <p>2. Select adult spawners of appropriate genetic makeup to minimize genetic contamination of existing hatchery and naturally producing stocks of salmon and steelhead. Given the present difficulty of determining genetic makeup of spawners selected for hatcheries, this action will necessarily be of an experimental nature. Hatchery reared adults may be preferentially selected or not selected if they are adequately marked or tagged, or have other identifiable feature. Other methods may be developed to genetically categorize naturally produced or hatchery fish.</p>

NORTH SACRAMENTO VALLEY ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Streamflow		General Target. More closely emulate the seasonal streamflow patterns in Clear, Cow and Battle Creeks in most year-types by providing or maintaining flows that mobilize and transport sediments, allow up and downstream fish passage, create point bars, and contribute to stream channel meander and riparian vegetation succession. 1. Increase flow in Cow Creek by from 25-50 cfs corresponding to the natural seasonal runoff pattern, and maintain from 25-75 cfs during October.	1. Increase flow in Cow Creek purchasing water from willing sellers or implementing a conjunctive groundwater program.
		2. Increase flow in Clear Creek to from 150-200 cfs from October 1 to June 1, and from 100-150 cfs from June 1 to September 30.	1. Develop a cooperative program to improve flow in Clear Creek by increasing releases from Clair Hill and Whiskeytown dams.
		3. Augment flow in Battle Creek by from 25-50 cfs.	1. Increase flow in Battle Creek by direct purchase of water from willing sellers or by providing compensation for forgone power production.
		4. Augment flow in Bear Creek by from 10-20 cfs	1. Increase Bear Creek flow by direct purchase of water from willing sellers by providing alternative sources of water to diverters during important fish-passage periods in spring and fall.
Stream MeanderBelts		General Target: Preserve or restore the 50- to 100-year floodplain and existing channel meander characteristics of Clear Creek, particularly in low-gradient areas where most sediment deposition occurs and where stream channel meander is most pronounced. 1. Reestablish the floodplain and natural stream channel meander in the lower 8 miles of Clear Creek.	1. Acquire floodplains by direct purchase or easement from willing sellers
		2. Create a more-defined stream channel in the lower 8 miles of Clear Creek to facilitate fish passage.	1. Develop a cooperative program to improve lower Clear Creek by maintaining flow connection with the Sacramento River by regrading the channel and controlling vegetative encroachment.

NORTH SACRAMENTO VALLEY ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Gravel Recruitment		1. Increase existing levels of erosion and gravel recruitment in Clear Creek by from 25-50 tons per year.	1. Develop a cooperative program to improve gravel quality and quantity in lower Clear Creek to maintain quality spawning conditions for fall-run and late fall-run chinook salmon adding from 5,000-10,000 cubic yards per year. Evaluate the need to acquire and/or relocate existing mining operations. Remove or alter Saeltzer Dam so that it no longer serves as a sediment trap.
		2. Increase existing levels of erosion and gravel recruitment in Cow Creek by from 5-10 tons per year.	1. Develop a cooperative program to protect existing gravel and bedload movement in Cow Creek to maintain and increase future spawning gravel and sediment input to the Sacramento River by from 5-10 tons per year by evaluating the need or opportunity to acquire and/or relocate existing gravel mining operations
Land Use		1. Protect, restore, and maintain ecological functions and processes in the Clear, Cow, Bear, and Battle Creek watersheds by eliminating conflicts between land use practices and watershed health.	<p>1. Work with landowners, land management agencies, and hydropower operators to facilitate watershed protection and restoration and increase the survival of chinook salmon and steelhead in Battle, Clear, Bear, and Cow Creeks by implementing land use plans that establish, restore and maintain riparian habitats and create buffer zones between the creek and developments or other land use activities such as livestock grazing.</p> <p>2. Develop a cooperative program to install from 100,000-150,000 feet of fencing in the Cow Creek watershed to protect the riparian corridor from livestock grazing.</p>

NORTH SACRAMENTO VALLEY ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Dams, Reservoirs, and Other Human-Made Structures		<p>General Target: Eliminate or reduce water uses that conflict with increasing the success of spawning adults and survival of juvenile chinook salmon and steelhead by managing or reconstructing facilities and structures that impair fish passage and fish survival.</p> <p>1: Work with landowners and diverters on Cow Creek to reduce the adverse effects of 13 seasonal diversion dams in South Cow Creek, 10 diversions in Old Cow Creek, two in North Cow Creek, and one in Clover Creek that are barriers to migrating chinook salmon and steelhead to allow access to 100% of the habitat below any natural bedrock falls.</p>	1. Improve passage condition on Cow Creek by acquiring water rights from willing sellers, removing diversions, or providing alternative sources of water during important periods.
		2. Work with landowners and diverters on Bear Creek to reduce the adverse effects of dewatering the stream channel at seasonal diversion dams, which results in no passage for migrating chinook salmon.	1. Improve passage and habitat conditions in Bear Creek by acquiring water rights from willing sellers, evaluating the removal of diversions dams, or providing alternative sources of water during important periods.
		3. Work with landowners, diverters, and other State or federal agencies managing Battle Creek to improve fish passage.	1. Develop a cooperative program to upgrade or replace existing fish ladders or evaluate the removal of diversion dams and other impediments to passage.
		4. Work with landowners and diverters on Clear Creek to improve fish passage between its mouth and Whiskeytown Dam.	1. Develop a cooperative program to improve fish passage on Clear Creek by upgrading or replacing all fish ladders or by evaluating the removal of diversion dams and other impediments to passage below Whiskeytown Dam.
		5. Reduce or eliminate conflicts in Battle Creek that require excluding anadromous fish from the upper section to protect the Coleman National Fish Hatchery water supply.	1. Develop an alternative or disease-free water supply for Coleman National Fish Hatchery to allow naturally-spawning salmon and steelhead access to the full 41-mile reach of Battle Creek above the Coleman National Fish Hatchery weir.

NORTH SACRAMENTO VALLEY ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Water Management		1. Reduce or eliminate conflicts between the diversion of water and the adverse effects to chinook salmon and steelhead populations at all diversion sites on Battle Creek.	1. Develop a cooperative approach to improve conditions for anadromous fish in Battle Creek by installing fish screens at four diversions on the North Fork, three diversions on the South Fork, and one on the mainstem, or acquire water rights to eliminate the need for diversion and screening. 2. Improve the survival of adult salmon and steelhead in Battle Creek by installing a rack at the head of Grover Diversion Canal to prevent straying.
		2. Reduce or eliminate conflicts between the diversion of water and the adverse effects on chinook salmon and steelhead populations at all diversions on Clear Creek.	1. Install a fish screen in Clear Creek at the McCormick-Saeltzer Dam or acquire water rights to eliminate need for diversion.

COTTONWOOD CREEK ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Streamflow	Upper Cottonwood Creek Lower Cottonwood Creek Fan.	1. During the summer and fall more closely emulate the seasonal streamflow pattern such that flows are sufficient for holding and spawning in most year types by providing up to 20 to 50 cfs that mobilize and transport sediments, allow up and downstream fish passage, create point bars, and contribute to stream channel meander and riparian vegetation succession	1. Augment summer and fall flow in Cottonwood Creek by the purchase of water from willing sellers and the development of alternative supplies. 2. Cooperatively evaluate the development of a watershed management program which could contribute to improved runoff patterns in the upper ecological unit of Cottonwood Creek.
Stream Meander Belts		1. Preserve or restore the 50 to 100 year flood plain and existing channel meander characteristics of streams in the Cottonwood Creek Ecological Zone, particularly in low gradient areas throughout the lower 20 miles where most deposition occurs and where stream channel meander is most pronounced.	1. Cooperatively evaluate reestablishing the floodplain along the lower reach of Cottonwood Creek and evaluate the constructing of setback levees to reactivate channel meander in areas presently confined by levees. 2. In the short-term develop a cooperative program to mechanically create a more defined stream channel in lower Cottonwood Creek to facilitate fish passage by minimizing water infiltration through the streambed and maintaining flow connectivity with the Sacramento River until such time that natural meander returns.
Gravel Recruitment		1. Maintain existing levels of erosion and gravel recruitment in streams within the Cottonwood Creek Ecological Zone and provide for increasing the transport of these sediments to the Sacramento River by an average of 30 to 40,000 tons per year.	1. Cooperatively develop and implement a gravel management program for Cottonwood Creek to protect and maintain important ecological processes and functions related to sediment supply, gravel recruitment, and gravel cleansing and transport by working with State and local agencies and gravel operators to protect spawning gravel and enhance recruitment of spawning gravel to the Sacramento River in the valley sections of Cottonwood Creek. 2. Cooperate with the aggregate resource industry to relocate existing gravel operations on Cottonwood Creek to areas outside of the active stream channel.

COTTONWOOD CREEK ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Gravel Cleansing and Transport		1. Repair and rehabilitate spawning gravels in 10 to 20 miles of the lower South Fork and main stem of Cottonwood Creek.	1. In the short-term develop a cooperative program to rip and clean, or reconstruct important salmon spawning riffles on the South Fork Cottonwood Creek and on lower Cottonwood Creek below the South Fork.
Land Use		1. Protect, restore and maintain the Cottonwood Creek watershed by eliminating conflict between land use practices and watershed health.	<p>1. Cooperatively work with landowners and Federal land management agencies to facilitate watershed protection and restoration and reduce siltation to improve holding, spawning and rearing habitats for salmonids</p> <p>2. Develop a cooperative program to implement improved fencing, grazing, and other land management practices on private and National Forest lands and encourage local counties to adopt stronger grading and road building ordinances to control erosion</p>
Dams, Reservoirs, and Other Human-Made Structures		1. Increase the success of spawning chinook salmon and steelhead in Cottonwood Creek by managing or reconstructing facilities and structures that impair passage.	<p>1. Eliminate adult fall-run chinook stranding by cooperating with the local irrigation district to stop attraction flows in Crowley Gulch to improve spawning and survival of adult and juvenile chinook salmon and steelhead.</p> <p>2. Develop a cooperative program to restore the stream channel to prevent the Anderson-Cottonwood Irrigation District siphon from becoming a barrier to migration of spring- and fall-run chinook salmon and steelhead trout.</p>

COTTONWOOD CREEK ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Riparian Scrub, Woodland, and Forest		1. Develop a cooperative program to establish a continuous 130 mile riparian habitat zone along upper and lower Cottonwood Creek and its tributaries through conservation easements, fee acquisition, or voluntary landowner measures.	<p>1. Develop a cooperative program to establish, restore, and maintain riparian habitat on Cottonwood Creek through conservation easements, fee acquisition, or voluntary landowner cooperation.</p> <p>2. Encourage the development of long-term measures in the comprehensive watershed management plan to further improve water temperatures. Develop a cooperative approach with counties and local agencies to implement land use management to protect riparian vegetation along the streams and developing programs to restore lost riparian vegetation.</p> <p>3. Cooperatively negotiate long-term agreements with local landowners to maintain and restore riparian communities along the lower reaches of Cottonwood Creek .</p>

COLUSA BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Streamflow		1. More closely emulate the seasonal hydrograph in most water-year types by providing flows to mobilize and transport sediments, allow upstream and downstream fish passage, create point bars, and contribute to stream channel meander and riparian vegetation succession. Provide or maintain flows in Stony Creek of 100-150 cfs from October 1 to May 31 to permit the attraction, migration, spawning, and emigration of fall-run chinook salmon.	1. Develop a cooperative program to provide flows in Stony Creek that corresponds approximately to the seasonal runoff pattern by reducing the diversion of streamflow, implementing supplemental releases of water from Black Butte Reservoir, and reducing the diversion of streamflow into the TCC.
		2. Provide flows in Elder Creek that correspond to the seasonal runoff pattern.	1. Improve flows in Elder Creek by developing a cooperative program to reduce the diversion of streamflow and provide an alternative source of water.
Stream Meander Belts		1. Preserve existing channel meander characteristics of streams in the Colusa Basin Ecological Zone, particularly in low-gradient areas where most deposition takes place and stream channel meander is most pronounced. Improve channel meander in Stony Creek over existing conditions and create a distinct stream channel in the 18-mile stream reach below North Diversion Dam.	1. Develop a cooperative program to control or eradicate invasive plant species such as giant reed and salt cedar, which are impairing stream channel meander in the lower reaches of Stony Creek. 2. Develop a cooperative program to recontour and regrade 3-9 miles the Stony Creek streambed so that, over time, it can establish a natural meander regime and stream channel consistent with its location below Black Butte Dam and the present and future water supply operations.
		2. Improve channel meander in Thomes Creek over existing conditions.	1. Develop a cooperative program to control or eradicate invasive plant species such as giant reed and salt cedar, which are impairing stream channel meander in the lower reaches of Thomes Creek.
		3. Improve channel meander in the lower 10 miles of Elder Creek over existing conditions.	1. Develop a cooperative program to control or eradicate invasive plant species such as giant reed and salt cedar, which are impairing stream channel meander in the lower reaches of Elder Creek.

COLUSA BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Sediment Supply and Gravel Recruitment		1. Increase the quantity of sediment available for transport during storms and seasonal flow events. Improve the quantity of sediments transported and maintain an average annual bedload of 32,000-62,500 tons per year in Thomes Creek to improve salmon spawning habitat.	1. Improve the quantity of sediment transported in Thomes Creek by working cooperatively with the aggregate resource industry to modify gravel mining methods and assist gravel extraction operators to identify and relocate to alternative sources gravel and sand beyond the stream channel.
		2. Develop a cooperative program to improve the quantity of sediment transported in Stony Creek to improve salmon spawning habitat.	1. Improve the quantity of sediment in Stony Creek by working with the aggregate resource industry to modify gravel mining methods and assist gravel extraction operators in identifying and relocating to alternative sources of gravel and sand beyond the stream channel. 2. Supplement spawning gravel in Stony Creek at the North Diversion Dam, 18 miles above the mouth, by adding 5,000-10,000 tons per year.
		3. Improve the quantity of sediment transported and maintain an average bedload of 34,000 tons per year in Elder Creek to improve salmon spawning habitat.	1. Improve the quantity of sediment in Elder Creek by working cooperatively with the aggregate resource industry to modify gravel mining methods and assist gravel extraction operators in identifying and relocating to alternative sources of gravel and sand beyond the stream channel.
Water Temperature		1. Establish and maintain desirable water temperatures in the outflow of the Colusa Basin Drain during summer and fall base-flow periods and in low-flow springs of drier years to minimize adverse effects on fish populations and other aquatic organisms in the Sacramento River.	1. Work with regulatory agencies and local agricultural interests to identify management alternatives, including reuse, that will result in decreased outflow of the Colusa Basin Drain during periods when the temperature of the outfall water is above the ambient temperature of the Sacramento River. 2. Work with the appropriate management agencies and local governments to determine alternative sites for the discharge of water from the Colusa Basin Drain to reduce or eliminate adverse effects on fish populations and other aquatic organisms resulting from high water temperatures.

COLUSA BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Floodwater and Sediment Detention and Retention		1. Establish a desirable level of sediment deposition in the Colusa Basin	1. Improve the sediment deposition capacity of the Colusa Basin by working with local landowners to develop an integrated plan consistent with flood control requirements.
Land Use		1. Protect, restore and maintain ecological functions and processes in the Stony, Elder and Thomes Creek watersheds by eliminating conflicts between land use practices and watershed health.	1. Work with landowners, land management agencies, and hydropower facility operators to protect and restore the watershed and increase the survival of chinook salmon and steelhead in Stony, Elder, and Thomes Creeks. Encourage counties and local agencies to implement land use plans that establish, restore, and maintain riparian habitats and create buffer zones between the creek and developments or other land use activities such as livestock grazing.
Dams, Reservoirs, and Other Human-Made Structures		1. Reduce hindrances to migrating fish at all instream structures that constrain the passage in streams in the Colusa Basin Ecological Zone. Reduce use of seasonal diversion dams that are barriers to migrating chinook salmon and steelhead in Thomes Creek.	1. Improve fish passage at diversion structures by working with local landowners or irrigation districts to provide passage flows, provide alternative sources of water, acquire water rights and evaluate the removal or dams, or installation of state-of-the-art fish ladders.
		2. Develop a cooperative program to improve passage at water diversion structures to increase the success of spawning adult salmon in Stony Creek to allow access to 18-24 miles of habitat.	1. Improve fish passage in Stony Creek at the Glenn-Colusa Irrigation District canal siphon and the North Diversion Dam.
Water Management and Diversions		1. Reduce stranding or straying of fish migrating in streams in the Colusa Basin Ecological Zone.	1. Cooperatively evaluate alternatives to restore anadromous salmonids to 18-24 miles of Stony Creek by using water releases from Black Butte Dam, water exchanges with the Tehama-Colusa Canal Authority, long-term water diversion solutions at RBDD and the development of ecosystem water supplies. 2. Develop a cooperative program to restore access of anadromous fish to westside tributaries through development of defined migrational routes, sufficient flows, and adequate water temperatures, or prevent anadromous fish from entering the Colusa Basin Drain.

COLUSA BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		2. Develop a cooperative program to reduce conflicts between agricultural uses of water in fall and the need for flows to permit upstream migration for adult chinook salmon and steelhead and downstream emigration of juvenile fish.	1. Work with local landowners and irrigation districts to reduce adverse effects of fall flooding in agricultural fields by screening, providing carryover storage in upstream reservoirs, and managing the timing and quality of water released.
Contaminants		1. Reduce the adverse effects of herbicides, pesticides, fumigants, and other agents toxic to fish and wildlife in the Colusa Basin Ecological Zone.	1. Work with local agricultural interests and water districts to encourage the reuse of as much water from the Colusa Basin Drain as possible.

BUTTE BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Streamflow		1. Increase flow in Paynes Creek in spring and fall by 15-25 cfs.	1. Develop a cooperative approach to increase flow in Paynes Creek by acquiring water from willing sellers or by developing alternative supplies.
		2. Increase flow in Antelope Creek by 15-30 cfs during October 1 through June 30.	1. Develop a cooperative approach to increase flow in Antelope Creek by acquiring water from willing sellers or by providing alternative water supplies to diverters during the upstream and downstream migration of adult and juvenile spring-, fall-, and late-fall-run chinook salmon and steelhead trout.
		3. Increase the flow in Mill Creek by 25-50 cfs.	1. Develop a cooperative approach to increase flow in the lower 8 miles of Mill Creek by acquiring water from willing sellers or by providing alternative water supplies to diverters during the upstream migration of adult salmon and steelhead.
		4. Increase flow in the lower 10 miles of Deer Creek by acquiring 25-50 cfs.	1. Develop a cooperative approach to increase flow in the lower section of Deer Creek by acquiring water from willing sellers or by providing alternative supplies during the upstream migration of adult spring-run and fall-run chinook salmon and steelhead trout.
		5. Increase flow in Big Chico Creek by 50-75 cfs.	1. Develop a cooperative approach to increase flow in Big Chico Creek by acquiring water from willing sellers or by providing alternative water supplies to diverters during the upstream migration of adult chinook salmon and steelhead.
		6. Increase flow in Butte Creek by 25-50 cfs.	1. Develop a cooperative approach to increase flow in Butte Creek by seeking cooperative solutions for additional instream flows at the Parrott-Phelan Diversion Dam to improve habitat quality and passage for spring-run chinook salmon and steelhead trout.

BUTTE BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		7. Maintain a minimum flow of 40 cfs in Butte Creek below the Centerville Diversion Dam.	1. Develop a cooperative program to maintain a minimum flow in Butte Creek below the Centerville Diversion Dam and increase streamflow lower in the drainage by purchasing water rights from willing sellers.
Stream Meander Belts		1. Preserve or restore the 50- to 100-year floodplains along the lower reaches of streams in the Butte Basin Ecological Zone and construct setback levees to reactivate channel meander in areas presently confined by levees.	<p>1. Cooperatively evaluate the creation of a more defined stream channel in the lower 10 miles of Antelope Creek to facilitate fish passage by minimizing water infiltration through the streambed and maintaining flow connection with the Sacramento River.</p> <p>2. Cooperatively evaluate the creation of a more defined stream channel in the lower 5 miles of Deer Creek to facilitate fish passage by minimizing water infiltration through the streambed and maintaining flow connection with the Sacramento River.</p>
Gravel Recruitment		1. Maintain gravel recruitment and transport in Deer Creek at about 3,600 tons of sediment per year.	1. Implement a comprehensive watershed management plan to maintain the input of fine sediments at a low level and to provide an adequately balanced sediment budget to sustain quality spawning conditions for fall-run and late-fall-run chinook salmon.
		2. Develop a cooperative program to replenish spawning gravel in Big Chico Creek especially in stream reaches that have been modified for flood control so that there is no net loss of sediments transported through the Sycamore, Lindo Channel, and Big Chico Creek split.	1. Assist in the redesign and reconstruct the flood control box culvert structures on Big Chico Creek near the Five-Mile Recreation Area to allow the natural downstream transport of stream sediments.
		3. Develop a cooperative program to improve the quality of chinook salmon spawning habitat in the lower 8 miles of Mill Creek for fall- and late-fall-run chinook salmon.	1. Develop a cooperative program to improve spawning habitats in lower Mill Creek for chinook salmon by ripping or redesigning spawning areas and stream channels or by reactivating and maintaining natural sediment transport processes.

BUTTE BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		4. Improve spawning gravel and gravel availability in Butte Creek.	1. Develop a cooperative program to improve spawning habitat in Butte Creek by redesigning spawning areas and stream channels or by reactivation and maintain natural sediment transport processes.
Land use		1. Protect, restore, and maintain ecological functions and processes that create habitats for species that depend on the Delta, and reduce or eliminate stressors that impair their survival.	1. Develop a cooperative program with landowners, land management agencies, and hydropower operators to facilitate watershed protection and restoration, and increase the survival of chinook salmon and steelhead in Paynes, Antelope, Mill, Deer, Big Chico, and Butte Creeks by implementing land use plans that establish, restore, and maintain riparian habitats and create buffer zones between the creek and developments or other land use activities such as livestock grazing.
Dams, reservoirs, and other human-made structures		1. Improve the survival of chinook salmon and steelhead in Antelope Creek by cooperatively developing a program to reduce the use of seasonal diversion dam by 50% during the late spring and early fall and winter.	1. Develop a cooperative program to evaluate the reduced use of seasonal diversion dams that may be barriers to migrating chinook salmon and steelhead in Antelope Creek by acquiring water rights or providing alternative sources of water.
		2. Develop a cooperative program to improve the upstream passage of adult chinook salmon and steelhead in Big Chico Creek by providing access to 100% of habitat located below natural barriers.	1. Repair or reconstruct the fish ladders in Big Chico Creek to improve opportunity for the upstream passage of adult spring-run chinook salmon and steelhead trout. 2. Repair the Lindo Channel weir and fishway at the Lindo Channel box culvert at the Five Mile Diversion to improve upstream fish passage.
		3. Develop a cooperative approach to improve the upstream passage of adult spring-run chinook salmon and steelhead in Mill Creek by providing free access to 100% of available habitat.	1. Cooperatively develop and implement an interim fish passage corrective program at Clough Dam on Mill Creek until such time that a permanent solution is cooperatively developed with the landowners.

BUTTE BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		4. Develop a cooperative program to improve the upstream passage of adult spring-run chinook salmon and steelhead in Butte Creek to allow access to 100% of the habitat below the Centerville Head Dam.	<p>1. Increase the opportunity for the successful upstream passage of adult spring-run chinook salmon and steelhead on Butte Creek by developing a cooperative program to evaluate the feasibility of removing diversion dams and providing alternative sources of water or constructing new high-water volume fish ladders.</p> <p>2. Improve the survival and passage of chinook salmon and steelhead in Butte Creek by cooperatively developing and evaluating operational criteria and potential modifications to Butte Slough outfall.</p> <p>3. Increase the survival of chinook salmon in Butte Creek by cooperatively assist local interests in eliminating stranding at the drainage outfalls in the lower reach.</p>
Water management		<p>General Target: Screen diversion, consolidate diversions, and alter diversion timing.</p> <p>1. Improve the survival of chinook salmon and steelhead in Big Chico Creek by cooperatively developing a program to provide unimpaired access to the creek 100% of the time.</p>	<p>1. Relocate the M&T Ranch diversion from Big Chico Creek to the mainstem Sacramento River, and install positive barrier fish screens.</p> <p>2. Assist in the evaluation of the water management operation between Big Chico Creek and Lindo Channel to improve passage conditions for juvenile and adult spring-run chinook salmon and steelhead trout.</p>

BUTTE BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		2. Improve the survival of chinook salmon and steelhead in Butte Creek by cooperating in the installation of positive barrier fish screens on eight diversions.	<p>1. Improve the survival of juvenile chinook salmon and steelhead in Butte Creek by supporting the installation of screened portable pumps as an alternative to the Little Dry Creek diversion.</p> <p>2. Increase the survival of juvenile chinook salmon and steelhead on Butte Creek by assisting local interests in the installation of positive barrier fish screens at the Durham-Mutual Diversion Dam.</p> <p>3. Increase the survival of juvenile chinook salmon and steelhead on Butte Creek by assisting local interests in the installation of positive barrier fish screens at Adams Dam.</p> <p>4. Increase the survival of juvenile salmon and steelhead on Butte Creek by assisting local interests in the installation of positive barrier fish screens at Gorrill Dam.</p> <p>5. Increase the survival of juvenile salmon and steelhead on Butte Creek by evaluating the need to install a positive barrier fish screen at White Mallard Dam.</p>
Shaded Riverine Aquatic Habitat		<p>General Target: Restore 50 linear miles of riparian habitat along major tributaries of the Sacramento River to provide corridors of riparian vegetation and shaded riverine aquatic cover for anadromous and other fish species and to create high-quality habitat for associated special-status plant and animal species and other associated wildlife.</p> <p>1. Develop a cooperative program to restore and maintain riparian habitat along the lower 10 miles of Mill Creek.</p>	1. Develop a cooperative program to restore and maintain riparian habitat along Mill Creek through acquisition of conservation easement or by voluntary landowner participation.
		2. Develop a cooperative program to restore and maintain riparian habitat along the lower 10 miles of Deer Creek.	1. Negotiate long-term agreements with local landowners to maintain and restore riparian communities along the lower reaches of Deer Creek.

BUTTE BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		3. Develop a cooperative program to restore and maintain riparian habitat along 15 miles of Big Chico Creek.	1. Cooperate with local landowners to encourage revegetation of denuded stream reaches, and establish, restore, and maintain riparian habitat on Big Chico Creek.

FEATHER RIVER/SUTTER BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Streamflow		<p>General Target. More closely emulate the seasonal streamflow pattern in the Feather River by providing pulsed flows in March of 4,000-6,000 cfs in dry years, 6,000-8,000 cfs in below-normal years, and 8,000-10,000 cfs in above-normal years; and by providing or maintaining flows that mobilize and transport sediments, allow up and downstream fish passage, create point bars, and contribute to stream channel meander and riparian vegetation succession. In addition, provide minimum flows recommended by DFG (1993). Flows will be provided only if less than or equal to Oroville Reservoir inflow.</p> <p>1. Evaluate the potential benefits to increased salmon and steelhead production in the Feather River of releasing from Oroville Dam of 2,500 cfs during September-May and 1,100 cfs during June-August in wet and normal years, and 1,700 cfs during September-May and 800 cfs during June-August in dry years.</p>	<p>1. Develop a cooperative program to supplement flows in the Feather River with water transfers, new water supply, and water acquired from willing sellers consistent with applicable guidelines or negotiated agreements.</p>
		<p>2. Supplement flows in the Yuba River with March pulse flows of 2,000-3,000 cfs in dry years and 3,000-4,000 in normal years to improve conditions for all life stages of chinook salmon, steelhead, and American shad. In addition, minimum flows recommended at Marysville by DFG (1993) will be provided (see Table 3 below). Flows will be provided only if inflow to Englebright and New Bullards Bar Reservoirs are sufficient to meet the flows.</p>	<p>1. : Supplement flows in the Yuba River below Englebright Dam with water acquired from new water supplies, water transfers, and willing sellers consistent with applicable guidelines or negotiate agreements to improve conditions for all life stages of chinook salmon and steelhead to provide the following flows</p>
		<p>3. Supplement flows in the Bear River to improve conditions for all life history stages of chinook salmon and steelhead. A pulsed flow of 300-500 cfs will be provided in dry years (see Table 4).</p>	<p>1. Supplement flows in the Bear River with water provided from new water supplies, water transfers, and willing sellers consistent with applicable guidelines or negotiate agreements to improve conditions for all life history stages of chinook salmon and steelhead.</p>

FEATHER RIVER/SUTTER BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Stream Meander Migration		1. Preserve and expand the existing stream meander belts in the Feather, Yuba, and Bear rivers by a cumulative total of 1,000 acres of riparian lands in the meander zones.	<p>1. Acquire riparian and meander zone lands through direct purchase or easements with willing sellers or provide incentives for voluntary efforts to preserve and manage riparian areas on private land.</p> <p>2. Build local support for maintaining active meander zones by establishing a mechanism through which property owners would be reimbursed for lost lands resulting from natural meander.</p> <p>3. Develop a cooperative program to improve opportunities for natural meander by removing riprap and relocating other types of structures that impair stream meander to alternative sites.</p>
Gravel Recruitment, Cleansing, and Transport		1. Maintain existing levels of erosion and gravel recruitment in tributaries that sustain an adequate level of gravel recruitment or restore desirable levels through direct manipulation and input where the natural fluvial process has been interrupted by dams or other features that retain or remove the gravel supply.	<p>1. Develop a cooperative evaluation of the quality of spawning gravel in areas used by chinook salmon in the Feather River, and if indicated, consider gravel renovation or supplementation to enhance substrate quality by providing 4,000-8,000 tons of additional gravel below the hatchery as conditions require.</p> <p>2. Develop a cooperative evaluation of the quality of spawning gravel in areas used by chinook salmon in the Yuba River, and if indicated, consider gravel renovation or supplementation to enhance substrate quality.</p> <p>3. Develop a cooperative evaluation of the quality of spawning gravel in areas used by chinook salmon in the Bear River, and if indicated, consider gravel renovation or supplementation to enhance substrate quality.</p>

FEATHER RIVER/SUTTER BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Water Temperature		1. Improve water quality conditions in the Feather, Yuba, and Bear rivers to benefit anadromous fish.	<p>1. Develop and utilize a temperature model as a tool for management of the Feather River.</p> <p>2. Develop a cooperative program to identify and remove physical and water quality barriers in the Feather River that impede access for white sturgeon and green sturgeon to spawning habitat or facilitate passage around these barriers.</p> <p>3. Develop a cooperative approach to operate reservoirs in the Yuba River watershed to provide adequate water temperatures for anadromous fish.</p> <p>4. Develop a cooperative program to identify and implement actions that maintain mean daily water temperatures between 61°F and 65°F for at least one month from April 1 to June 30 for American shad spawning in the Feather River, consistent with actions to protect chinook salmon and steelhead and when hydrologic conditions are adequate to minimize adverse effects to water supply operations.</p> <p>5. Evaluate whether improvement of water temperature control via shutter configuration and present management of the cold water pool water pool at New Bullards Bar Dam on the Yuba River is effective, and modify the water release outlets at Englebright Dam if it is effective.</p> <p>6. Develop a cooperative program to identify and implement actions that maintain mean daily water temperatures between 61°F and 65°F for at least one month from April 1 to June 30 for American shad spawning in the Yuba River, consistent with actions to protect chinook salmon and steelhead and when hydrologic conditions are adequate to minimize adverse effects to water supply operations.</p>

FEATHER RIVER/SUTTER BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Floodwater and sediment detention and retention		1. Maintain existing level of floodwater retention in the Sutter Basin, decrease adverse affects on migratory pathways used by chinook salmon and steelhead to reach Butte Creek, and decrease adverse affect on salmon and steelhead of diverting water for seasonally flooded wetland areas.	1. Develop a cooperative program to install fish passage facilities at diversion weir structures throughout the Sutter Basin which impair upstream fish passage and develop new operational criteria to lessen adverse affects. 2. Programmatic Action 1b: Develop a cooperative program to consolidate, relocate, and install positive barrier fish screens at diversions in the Sutter Bypass by working with local landowners and State and federal agencies to minimize the entrainment of juvenile chinook salmon and steelhead.
Land use		1. Protect, restore and maintain ecological functions and processes in the Feather, Yuba, and Bear river watershed by eliminating conflicts between land use practices and watershed health.	1. Work with landowners, land management agencies, and hydropower operators to facilitate watershed protection and restoration and increase the survival of chinook salmon and steelhead in the Feather, Yuba, and Bear rivers and in the Sutter Basin by implementing land use plans which establish, restore and maintain riparian habitats and create buffer zones between the creek and developments or other land use activities such as livestock grazing.
Dams, reservoirs, and other human-made structures		1. Increase the survival of adult and juvenile anadromous fish in the Yuba River by providing access to 100 percent of the habitat available below Englebright Dam.	1. Develop a cooperative program to improve survival of anadromous fish in the Yuba River by removing dams or constructing fish ladders, providing passage flows, keeping channels open, eliminating predator habitat at instream structures, and constructing improved fish bypasses at diversions. 2. Facilitate passage of spawning adult salmonids in the Yuba River by maintaining appropriate flows through the fish ladders, or by modifying the fish ladders at diversion dams.

FEATHER RIVER/SUTTER BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		2. Improve survival of chinook salmon and steelhead in the Bear River by providing access to 100 percent of the habitat available below the South Sutter Water District diversion dam.	1. Improve survival and passage of chinook salmon and steelhead in the Bear River by negotiating with landowners for the removal or modifications of culvert crossings on the Bear River.
Unscreened diversions		<p>Implementation Objective: Reduce entrainment of juvenile fish into water diversions by screening or consolidating diversions or by altering diversion timing in order to increase survival and cohort replacement levels.</p> <p>NO TARGET WAS LISTED!!!!</p>	<p>1. Develop a cooperative program to improve efficiency of screening devices in the Yuba River at Hallwood-Cordua water diversion, and construct screens at the Brown's Valley water diversion and other unscreened diversions.</p> <p>2. Evaluate the need to improve the efficiency of the fish screening device an bypass at the Brophy-South Yuba Diversion on the Yuba River.</p> <p>3. Develop a cooperative program to evaluate and screen diversions in the Bear River to protect all life history stages of anadromous fish.</p> <p>4. Develop a cooperative program to evaluate and screen diversions in the Feather River to protect all life history stages of anadromous fish.</p>

FEATHER RIVER/SUTTER BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Shaded Riverine Aquatic		1. Provide conditions for growth of riparian vegetation along sections of rivers in the Feather River/Sutter Basin Ecological Zone.	<p>1. Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Yuba River.</p> <p>2. Evaluate the benefits of restoring stream channel and riparian habitats of the Yuba River, including the creation of side channels for spawning and rearing habitats for salmonids.</p> <p>3. Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Feather River.</p> <p>4. Purchase streambank conservation easements from willing sellers or establish voluntary incentive programs to improve salmonid habitat and instream cover along the Bear River.</p>
Artificial Production of Fish		1. Minimize the likelihood that hatchery reared salmon and steelhead could stray into adjacent non-natal streams rivers and streams in order to protect naturally produced salmon and steelhead.	1. Develop a cooperative program to evaluate the benefits of limiting stocking of Feather River Hatchery reared salmon and steelhead to the Feather River.

FEATHER RIVER/SUTTER BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		2. Employ methods to limit straying and loss of genetic integrity of wild and hatchery supported stocks.	<p>1. Rear hatchery salmon and steelhead in hatcheries on natal streams to limit straying.</p> <p>2. Limit stocking of salmon and steelhead fry and smolts to natal watersheds to minimize straying that may compromise the genetic integrity of naturally producing populations.</p> <p>3. Select adult spring-run chinook salmon spawners of appropriate genetic makeup to minimize genetic contamination of existing hatchery and naturally producing stocks of salmon. Given the present difficulty of determining genetic makeup of spawners selected for hatcheries, this action will necessarily be of an experimental nature. Hatchery reared adults may be preferentially selected or not selected if they are adequately marked or tagged, or have other identifiable feature. Other methods may be developed to genetically categorize naturally produced or hatchery fish.</p>

AMERICAN RIVER BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Streamflow		<p>1. Develop and implement an ecologically based river regulation plan that meets the recommended minimum and pulsed flow targets presented in Tables 1 and 2. Pulsed flows are to be coordinated with similar flows occurring naturally in the Sacramento Valley stream and from storage releases from Shasta and Oroville reservoirs.</p>	<p>1. Provide target flows by modifying CVP operations and by acquiring water as needed from willing sellers using CVPIA and CALFED funds, and considering available carryover storage and needs of water temperature objective (see below).</p> <p>2. Work with stakeholder groups such as the Water Forum, State and federal agencies, and local governments to develop a long-term water management plan for the American River that will meet a diversity of needs, including providing streamflows needed to maintain ecological processes and functions; maintaining habitats; and supporting chinook salmon, steelhead, and other anadromous and resident fish below Nimbus Dam. This plan may include a new diversion from near the mouth of the river rather than from Nimbus or Fairbairn to provide needs of water users. Opportunities for adjusting seasonal stream flow and carryover storage patterns to benefit fish and habitat while maintaining other beneficial uses will be explored. Opportunities may include acquisition of water rights from willing sellers, or development of supplemental supplies, e.g. conjunctive use, or recycled water programs.</p> <p>3. Develop a watershed restoration plan: Developing and implementing a comprehensive watershed management plan to protect the channel (e.g., maintain flood control capacity and reduce bank erosion) and preserve and restore the riparian corridor could facilitate restoration and maintenance of the American River. Upper watershed health should be improved by reducing forest fuels and implementing other watershed improvement practices to protect streamflows, stream channels, and riparian habitat and minimize sediment input to the stream.</p>

AMERICAN RIVER BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		2. Minimize seasonal flow changes below Nimbus Dam that reduce survival of juvenile anadromous fish.	1. Reduce and control flow fluctuations in the lower American River to avoid or minimize adverse effects on juvenile salmonids.
		3. Maintain mean daily water temperatures of 61-65°F for at least 2-weeks between May 15 and June 30 to encourage American shad spawning below Nimbus Dam	1. Regulate the amount of water and point of release of water from Nimbus Dam to allow water to warm sufficiently for shad to spawn in lower American River, but only if such an increase in water temperature and any necessary change in flow will not be detrimental to steelhead eggs and fry and salmon smolts.
Natural Stream Channel processes		1. Preserve existing natural channel processes in the lower American River, particularly in low-gradient areas where most deposition occurs and where stream channel meander is most pronounced.	1. Maintain floodplain along the lower American River by working with local entities to develop a floodplain management program consistent with flood control needs. Entities include US Army Corps of Engineers, the California Reclamation Board, the Sacramento Area Flood Control Agency, the Lower American River Task Force, and the Water Forum
		2. Maintain a 4,800-acre floodplain along the American River between Nimbus Dam and the Sacramento River that emulates a natural stream channel configuration	1. Where necessary artificially maintain mainstem and side channels in a natural state to provide for the natural functions of salmon and steelhead spawning and rearing habitat.
Gravel Recruitment		1. Maintain, improve, or supplement existing levels of erosion and gravel recruitment in the lower American River by annually providing 6,000-10,000 tons of spawning gravel to the upper river below Nimbus Dam.	1. Improve gravel quality and quantity in the lower American River by periodically adding spawning gravel directly to the river, which during high-flow events will mobilize and redistribute downstream.

AMERICAN RIVER BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Water Temperature		1. Provide water that is 60°F or cooler for chinook salmon and steelhead spawning in the lower American River beginning in middle to late October and continuing through April.	1. Reconfigure Folsom Dam shutters to improve management of Folsom Reservoir's coldwater pool and maintain better control over the temperature of water released downstream. 2. Reconfigure Nimbus Dam turbine intakes to improve ability to selectively release warmer surface waters or cooler deeper waters as needed to control temperature of water released downstream. Also ensure adequate temperature water is released from the dam in the event of turbine shutdown or other need to spill.
		2. Provide water that is 60-65°F in May and June to allow successful spawning of American shad.	1. Provide sufficient warmer water releases from Folsom and Nimbus dams as necessary to provide target temperature.
		3. Provide water that is 65°F or cooler for over-summer rearing of steelhead in the lower American River.	1. Provide sufficient cold water releases from Folsom and Nimbus dams as necessary to provide target temperatures. 2. Artificially construct side channels that provide thermal refuges for over-summer rearing juvenile steelhead in the lower American River. Such habitat would take advantage of available cool sub-surface flows of water in the flood plain.
Unscreened and Poorly Screened diversions		1. Improve the survival of juvenile anadromous fish from the adverse effects of diverting water from the lower American River below Folsom Dam.	1. Improve the fish screen at Fairbairn Water Treatment Plant.

AMERICAN RIVER BASIN ECOLOGICAL ZONE
Targets and Actions

Resource Element	Location	Target	Actions
Shaded Riverine Aquatic Habitat		1. Provide a sustainable corridor of riparian scrub, woodland, and forest along the entire length of the lower American River.	1. Develop a riparian corridor management plan to improve and protect riparian habitat and instream cover. 2: Terminate or modify current programs that remove woody debris from the river channel. 3: Construct artificial stream channels along the lower American River that provide additional riparian corridors for fish and wildlife habitat.

YOLO BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Stream Flow		<p>1. More closely emulate the pattern of the seasonal hydrograph in Cache and Putah Creeks by providing and allowing about 50-100 cfs in all but critical years to reach the Yolo Bypass, and providing winter base flows sufficient to sustain salmon spawning and rearing. Provide a portion of the natural late-winter/early spring (March) pulse of 100-200 cfs in dry years and 300-400 cfs in normal years. Water would only be provided when an equivalent amount of Cache Creek and Putah Creek inflow is present. Flows in the Yolo Bypass would be supplemented by the Colusa Basin Drain via the Knights Landing Ridge Cut, and the Sacramento River via the Freemont Weir as needed. Supplemental flows may be needed in the fall if water temperature and flow in the lower Yolo Bypass are insufficient for upstream passage from Cache Slough to the mouths of Cache and Putah Creeks. Supplemental flows may be needed in winter and spring to sustain downstream migrating juvenile salmon and steelhead from Cache and Putah Creeks on their journey through the Yolo Bypass to the Delta. Supplemental flows would be needed along with irrigation water from spring to fall to sustain native fish, wetlands, and riparian habitats in channel-sloughs of the Yolo Bypass.</p>	<p>1. Develop a cooperative program to provide water for these flows in Cache Creek by passing inflows to Clear Lake and Indian Valley Reservoir through to the river and assuring that they are not diverted in the lower river. Water would be obtained from willing sellers, water transfers, and developing new supplies including ground water.</p> <p>2. Develop a cooperative program to provide water for the target flows in Putah Creek from additional releases from Lake Berryessa or reductions in water diversions at Solano Dam and in the creek downstream from the dam. Water would be obtained from willing sellers, water transfers, and developing new supplies including ground water.</p> <p>3. Cooperatively evaluate the feasibility of providing water for the upper Yolo Bypass portion of the Cache Creek Unit by redirecting water from Colusa Basin Drain via the Knights Landing Ridge Cut Canal and the Sacramento River via Grays Bend-Old River-Freemont Weir complex.</p>
Gravel Recruitment		<p>1. Restore a desirable level of gravel recruitment in spawning and rearing areas of salmon and steelhead in Cache and Putah creeks to meet the needs of spawning fish, maintain natural stream channel meanders and bar formation, and match existing rates of downstream displacement.</p>	<p>1. Develop a cooperative program to supplement gravel recruitment below Capay and Solano diversion dams as needed to replace natural gravel recruitment interrupted by these diversion dams.</p> <p>2. Develop a cooperative program to supplement gravel in areas downstream of the diversion dams where other structures or gravel mining have interrupted the gravel recruitment process.</p>

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YOLO BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Stream Channel Configuration		1. More closely emulate natural stream-channel configurations in Cache Creek and Putah Creek, as well as in channels and sloughs of the upper Yolo Bypass by using available hydrologic and sediment regimes, in a manner consistent with flood control requirements.	1. Cooperatively evaluate the feasibility of modifying the cross sections and channel configurations in Cache Creek and Putah Creek to provide a more natural configuration, while maintaining consistency with flood control requirements. 2. Evaluate the feasibility of reconfiguring the Yolo Bypass to restore a natural configuration with slough connections with Cache and Putah creeks within existing flood control constraints while protecting important land uses and infrastructure.
Floodwater and Sediment Detention and Retention		1. Establish a desirable level of floodwater retention potential by expanding, where feasible and consistent with flood protection, the floodplain area of the Yolo Bypass, lower Cache Creek, and lower Putah Creek.	1. Cooperatively evaluate the feasibility of reoperating and modifying the Yolo Basin to increase its capacity for floodwater detention and sediment retention by reconfiguring levees, channels, and other physical constraints to large volume flow events.
Vegetation Succession, Overbank Flooding, and Floodplain Inundation		1. Increase overbank flooding potential to floodplains, where feasible and consistent with flood protection, to support a desirable vegetation succession process.	1. Evaluate opportunities to provide flow to Yolo Bypass from Colusa Drain and Sacramento River (via Freemont Weir) in dry and normal water years, as well as normally occurring overflow in wetter years. Allow flows to flood the Yolo Bypass flood plain.
		2. Increase the area, frequency, and duration of flooding to existing the Cache Creek and Putah Creek floodplains during the wet season, where feasible and consistent with flood protection.	1. Evaluate the feasibility of developing flood plain overflow areas in the lower Cache and Putah creek flood plains. Such areas would include sloughs and creek channels, as well as wetlands.
Exotic Species		1. Reduce populations of invasive exotic plant species that compete with the establishment and succession of native riparian vegetation along Cache Creek and Putah Creek to assist in the natural reestablishment of native riparian vegetation in floodplains, increase shaded riverine aquatic cover for fish, and increase habitat values for riparian associated wildlife.	1. Develop a cooperative program to monitor the distribution and abundance of invasive exotic plants and develop cooperative control programs as needed.

YOLO BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Unscreened Diversions		1. Eliminate, relocate, or screen all diversions in the lower Cache and Putah creeks, and channels-sloughs of the Yolo Bypass.	<p>1. Purchase water rights where possible to minimize water diversions along Putah and Cache creeks, and the Yolo Bypass.</p> <p>2. Develop a cooperative program to provide alternative sources of water to diverters needing water from the creeks or Bypass.</p> <p>3. Develop a cooperative program to relocate diversions from the creeks or bypass to other irrigation canals.</p> <p>4. Evaluate the feasibility of screening diversions with positive barrier fish screens.</p>
Stranding ???		1. Ensure adult salmon and steelhead do not become stranded during their upstream migrations.	<p>1. Evaluate the feasibility of constructing fish passage facilities at the Grays Bend-Old River-Freemont Weir complex at the upper end of the Yolo Bypass.</p> <p>2. Develop a cooperative program to construct a weir or screen at the lower end of the Knights Landing Ridge Cut to keep adult salmon and steelhead from migrating upstream into the Colusa Basin Drain.</p> <p>3. Evaluate the feasibility of providing an adequate channel for adult salmon and steelhead between the lower ends of Cache and Putah creeks and channel-sloughs of the Yolo Bypass.</p>
		2. Reduce the loss of adult and juvenile salmon, steelhead, and native fishes from being stranded in flooded lands of the Yolo Bypass, Cache Creek, and Putah Creek.	1. Develop a cooperative program to improve the connections of the flood plains of Yolo Bypass, Cache Creek, and Putah Creek with the channels and sloughs flowing into the Delta by providing adequate drains and canals from agricultural lands, irrigation canals, ponds, wetlands, side-channels, and sloughs.

YOLO BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Fish Passage		1. Improve fish passage between the Delta and spawning grounds in Putah and Cache creeks and the upper Sacramento River watersheds.	1. Evaluate the feasibility of constructing fish passage facilities at the Grays Bend-Old River-Freemont Weir complex at the upper end of the Yolo Bypass. 2. Evaluate the feasibility of constructing fish passage facilities at Capay Dam and Solano Dam.
Gravel Mining		1. Protect, enhance, and restore natural gravel recruitment in areas of active and inactive gravel mining.	1. Develop a cooperative program to fill remnant gravel pits within the active floodplain of the creeks, and restore natural channel configurations where remnant effects of gravel mining are present.
Harvest of Fish and Wildlife		1. Reduce illegal harvest of salmon and steelhead in the Yolo Bypass, Cache Creek, and Putah Creek.	1. Increase enforcement of fish and game regulations along the creeks and Bypass. 2. Develop a cooperative program to improve education programs in local cities and towns as to the importance of protecting salmon and steelhead. 3. Provide for a "poachers" hotline to report illegal harvest activities.
Riparian and Shaded Riverine Aquatic		1. Restore riparian vegetation along Cache Creek, Putah Creek, and Yolo Bypass and Solano Unit channels-sloughs where possible to provide cover and other essential habitat requirements for salmon and steelhead and native resident fish species, and wildlife.	1. Develop a cooperative program to restore riparian vegetation where possible. 2. Develop a cooperative program to protect existing riparian corridors along creeks, streams, sloughs, and channels connecting to the Delta. 3. Develop a cooperative program to plant riparian vegetation and provide for early development until such time that it becomes naturally self-sustaining. 4. Develop a cooperative control program for invasive exotic riparian plants where necessary to ensure development of healthy natural riparian corridors.

EASTSIDE DELTA TRIBUTARIES ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Streamflow		1. For the Cosumnes River, where a natural streamflow pattern presently exists with natural winter and spring streamflows, the target is to restore summer and fall base flows to a natural level.	1. Improve summer and fall base flows on the Cosumnes River by developing new water supplies along the river and by purchases from willing sellers.
		2. For the Mokelumne River with its greatly altered hydrograph pattern restore a natural streamflow pattern by implementing and evaluating the base flow regime in the Principles of Agreement for the lower Mokelumne River. In addition, streamflows should be enhanced below Camanche and Woodbridge dams by providing minimum flows recommended by DFG in dry years of 200-300 cfs from November through September and 100 cfs in October. In normal years minimum flows should be 250-450 cfs from October through June and 100-150 cfs from July through September. In wet years minimum flows should be 300-450 year round. In addition, a flow pulse should be provided in late April or early May, with the pulse averaging 500-1,000 cfs in dry years, 1,000-2,000 cfs in normal years, and 2,000-3,000 cfs in wet years.	1. Cooperatively evaluate the potential for minimizing water supply impacts by replacing the diversions at Woodbridge with other Delta diversions.
		3. For the Calaveras River, where the natural streamflow has been greatly altered, streamflows should be enhanced below New Hogan Dam by the minimum flows recommended by DFG. In addition, a flow pulse should be provided in late February or early March, with the pulse averaging 100-200 cfs in dry years, 300-400 cfs in normal years, and 600-800 cfs in wet years. Such flows would be provided only when inflows to New Hogan Reservoir are at these levels.	1. Provide target flows for the Mokelumne and Calaveras rivers from storage releases, but only if there is sufficient inflows into storage reservoirs to meet target levels. The additional water would be obtained from developing new water supplies within the Central Valley Basin, water transfers, and willing sellers of water. 2. Cooperatively evaluate the potential for resizing of criteria at New Hogan Reservoir on the Calaveras River to yield additional water for instream flow needs while maintaining or improving flood control requirements.
			general??: Cooperatively develop a program to minimize or eliminate unpermitted water diversions.

EASTSIDE DELTA TRIBUTARIES ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Gravel Recruitment		1. On the Mokelumne River provide for the annual recruitment of 5,000 to 10,000 cubic yards of gravel into the active stream channel.	1. Develop a cooperative program with the aggregate resource industry to improve extraction activities within the Mokelumne River floodplain.
		2. On the Calaveras River provide for the annual recruitment of 2,000 to 4,000 cubic yards of gravel into the active stream channel.	
			General 1: Cooperatively develop a program to protect all existing sources of gravel recruitment to the rivers. General 2: Develop a cooperative program to supplement gravel with artificial introductions.
Gravel Cleansing and Transport		1. Restore gravel transport and cleaning process to attain sufficient high quality salmon spawning habitat in each of the three streams for target population levels.	1. Develop a cooperative program to provide late winter or early spring pulsed flows as needed, to establish appropriate flushing/channel maintenance flows. 2. Facilitate transport of fine sediments by restoring as necessary the river channel configuration so that it is consistent with planned flow regime, and available sediment supply. 3. Develop a cooperative program to improve the flexibility of upstream reservoir management to minimize fine sediment inputs to the lower Mokelumne and Calaveras rivers. 4. Develop a cooperative evaluation of mechanically cleaning spawning gravel at selected sites in lower Mokelumne and Calaveras rivers.

EASTSIDE DELTA TRIBUTARIES ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Water Temperature		1. Maintain mean daily water temperatures at or below levels suitable for maintenance of all life stages of fall-run chinook salmon and steelhead resources.	<ol style="list-style-type: none">1. Cooperatively evaluate the feasibility of releasing sufficient instream flows to improve temperature conditions for key resources in the Mokelumne and Calaveras rivers.2. Establish minimum pool size at New Hogan Reservoir to ensure cold-water releases into the Calaveras River.3. Cooperatively develop reservoir and stream temperature models for the Calaveras River to identify potential for water temperature improvement.4. Evaluate the potential for installation of a temperature control device at Camanche Dam to reduce water temperatures during critical periods in the lower Mokelumne River.5. Establish a minimum pool in Camanche Reservoir to ensure adequate cold water for fall storage releases into the lower Mokelumne River.6. Balance Pardee Reservoir releases with Camanche Reservoir releases to ensure cold water releases into the lower Mokelumne River.7. Develop a cooperative program to restore riparian woodlands along the entire length of the Cosumnes River.8. Develop a cooperative program to restore riparian woodlands along the lower Mokelumne and Calaveras rivers.

EASTSIDE DELTA TRIBUTARIES ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Land Use		1. Reduce fine sediment input into three streams.	1. Evaluate the feasibility of construction of sediment retention basins to reduce fine sediment input. 2. Develop a cooperative program with local interests to improve land management and livestock grazing practices along stream/riparian zones to reduce streambank erosion and sediment input.
		2. Develop a cooperative program to protect high quality riparian habitat along the three streams.	1. Where necessary purchase easements or properties in riparian corridors of the three rivers to preserve or improve riparian habitats in salmon spawning and rearing areas.
		3. Develop a cooperative program to improve all poor quality riparian habitat between the San Joaquin River and spawning grounds of chinook salmon in the three streams.	1. Where necessary purchase easements or properties in riparian corridors of the three rivers to preserve or improve riparian habitats in salmon spawning and rearing areas.
Predation and Competition		1. Reduce level of predation on juvenile salmonids below Woodbridge Dam on the lower Mokelumne River.	1. Develop a cooperative program to rebuild the Woodbridge Dam fish passage and diversion screening facilities to minimize losses of downstream migrating salmon and steelhead while maintain other important attributes.

EASTSIDE DELTA TRIBUTARIES ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Dams, Reservoirs, and Other Humna-Made Structures		1. Improve anadromous fish passage at dams and diversion structures.	<p>1. Develop a cooperative program to evaluate the need for passage improvements at small dams on the lower Cosumnes River.</p> <p>2. Develop a cooperative evaluation on the effects of WID diversion and Lake Lodi on juvenile salmonid survival and migration on the lower Mokelumne River; evaluate the benefits of delaying installation of flashboards at Woodbridge Dam until smolt outmigration ends.</p> <p>3. Develop a cooperative evaluation of the feasibility and potential benefits of constructing a bypass canal around Lake Lodi on the lower Mokelumne River to reduce losses of juvenile salmonids.</p> <p>4. Develop a cooperative program to upgrade the fish passage facilities at Woodbridge Dam on the Lower Mokelumne River for adult salmon upstream passage and juvenile salmon downstream passage.</p> <p>5. Develop a cooperative program to provide fish passage at temporary irrigation dams in the Calaveras River, Mormon Slough, and the Stockton Diverting Canal.</p> <p>6. Develop a cooperative program to install fish passage facilities at Bellota Weir, Clements Dam, and Cherryland Dam on the Calaveras River and provide passage flows.</p>

EASTSIDE DELTA TRIBUTARIES ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Unscreened Diversions		1. Reduce entrainment of fish and other aquatic organisms into diversion as much as possible in all three streams.	<ol style="list-style-type: none">1. Install permanent fish screen at North San Joaquin Conservation District diversion on the lower Mokelumne River.2. Improve fish screen and bypass at Woodbridge Dam on the lower Mokelumne River to meet DFG and federal screening criteria.3. Evaluate the feasibility of installing state-of-the-art screens on small pump diversions.4. Develop a cooperative program to operate temporary screens at diversions where juvenile salmon rear or during seasons when they pass downstream by the diversion site.
Contaminants		1. Reduce poor water quality problems in the tailwaters of Camanche Dam on the Mokelumne River.	<ol style="list-style-type: none">1. Cooperatively evaluate options for constructing a multilevel outlet structure at Camanche Dam.2. Support EBMUD in developing operating regimes at Pardee and Camanche reservoirs that optimize water quality below Camanche Dam.
Harvest of Fish and Wildlife		1. Reduce the loss of adult fall-run chinook salmon and steelhead to illegal harvest in all three rivers.	<ol style="list-style-type: none">1. Provide additional law enforcement to enforce harvest regulations and to reduce poaching on all three rivers.2. Change angling regulations and restrictions to better protect naturally spawning salmon and steelhead.3. Increase public awareness of illegal harvest through education programs for all three rivers.4. Provide opportunities (e.g., poaching hotline) and incentives (rewards) for reporting illegal harvest violations.

EASTSIDE DELTA TRIBUTARIES ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Artificial Production of Fish		1. Minimize the likelihood that hatchery reared salmon and steelhead could stray into adjacent non-natal streams rivers and streams in order to protect naturally produced salmon and steelhead.	1. Develop a cooperative program to evaluate the benefits of limiting stocking of Mokelumne River Hatchery reared salmon and steelhead to the Merced River.
		2. Employ methods to limit straying and loss of genetic integrity of wild and hatchery supported stocks.	1. Rear hatchery salmon and steelhead in hatcheries on natal streams to limit straying. 2. Limit stocking of salmon and steelhead fry and smolts to natal watersheds to minimize straying that may compromise the genetic integrity of naturally producing populations.
Shaded Riverine Aquatic		1. Restore a minimum of 15 stream miles of self-sustaining diverse riparian community along the Mokelumne River. Protect riparian habitat along the Cosumnes River and Calaveras River.	1. Develop a cooperative program to restrict further removal of riparian vegetation. Establish riparian corridor protection zones along all three rivers. 2. Develop a cooperative program to implement riparian restoration activities. 3. Encourage implementation of improved land management and livestock grazing practices along stream/riparian zones. 4. Purchase stream bank conservation easements from willing sellers to widen riparian corridors.

SAN JOAQUIN RIVER ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Streamflow		1. Manage flow releases from tributary streams to provide adequate up and downstream passage of fall-run and late-fall run chinook salmon, rainbow trout/steelhead, and spawning and rearing habitat for American shad, splittail and sturgeon from Merced River confluence to Vernalis.	1. Evaluate feasibility of providing increased flows to restore habitat for key resources.
		2. Manage flow releases from Friant Dam to Gravelly Ford for maintenance of resident native fishes.	
Stream meander migration		1. Restore the defined floodplain; reestablish stream meander zone on the San Joaquin River between Vernalis and the mouth of the Merced River..	1. Develop a cooperative program to evaluate the potential for levee deauthorization. 2. Develop a cooperative strategy to acquire or obtain easements on floodplain and riparian land needed to meet restoration goals.
Water temperature		1. Manage reservoir releases and other factors to provide suitable water temperatures for key resources from the Merced River confluence to Vernalis.	1. Evaluate the feasibility of releasing sufficient instream flows to improve the temperature regime for key resources. 2. Evaluate the use of upstream temperature control devices/reservoir management options to reduce water temperatures during critical periods. 3. Develop a cooperative program to evaluate the potential for riparian vegetation restoration to reduce water temperatures. 4. Develop a cooperative program to valuate the impact of discharge returns on stream temperature.

SAN JOAQUIN RIVER ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Levees, bridges, and bank protection		1. Set back 10 miles of levees along the San Joaquin River between the Merced River confluence and Vernalis where feasible to reestablish the hydrologic connectivity between these channels and natural floodplains.	1. Develop a cooperative strategy to evaluate the potential for levee deauthorization or relocation. 2. Develop a cooperative program to acquire or obtain easements on floodplain and riparian land needed to meet restoration goals.
Land use		1. Restore balanced fine sediment regime, maintaining fine sediment input in balance with transport from the system.	1. Develop a cooperative program to encourage implementation of improved land management and livestock grazing practices along stream/riparian zones to reduce streambank erosion and sediment input. 2. Develop a cooperative program to remove fine sediments from the stream channel. 3. Facilitate transport of fine sediments by restoring the balance between river channel configuration, flow regime, and sediment supply.
Water management and diversions		1. Reduce entrainment of fish and other aquatic organisms into diversions by 50%, by volume, from Merced River confluence to Vernalis.	1. Develop a cooperative approach to install state-of-the-art fish screens at El Solyo, Patterson, and West Stanislaus Irrigation District diversions. 2. Develop a cooperative program to evaluate the feasibility of installing state-of-the-art screens on small to medium size diversions.
		1. Eliminate the loss of adult fall-run chinook salmon straying into the San Joaquin River upstream of the Merced River confluence.	1. Continue annual installation of a temporary weir on the San Joaquin River immediately upstream from the confluence with the Merced River to block adult salmon migration.

SAN JOAQUIN RIVER ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Contaminants		1. Reduce losses of fish and wildlife due to pesticide, hydrocarbon, heavy metal, and other pollutant use in the basin.	1. Provide additional funding to enforce state laws pertaining to point and non-point source pollution. 2. Develop a cooperative program to strengthen existing water quality standards as needed. 3. Work cooperatively with local landowners and state and federal agencies to encourage implementation of improved land management practices to reduce contaminant input. 4. Evaluate the use of real-time releases from tile drainage.
Shaded riverine aquatic		1. Restore 50 stream miles of self-sustaining diverse riparian community.	1. Develop a cooperative program to restrict further removal of riparian vegetation. 2. Develop a cooperative program to implement riparian restoration. 3. Encourage implementation of improved land management and livestock grazing practices along stream/riparian zones.

EAST SAN JOAQUIN BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Streamflow		<p>1. Maintain the following baseflows in the Stanislaus River below Tullock Dam:</p> <ul style="list-style-type: none">■ in critical, dry, and below-normal years of 200-300 cfs except for a flow pulse of 1,500 cfs for 30 days in April-May;■ in above-normal years minimum flows should be 300-350 cfs except for 800 cfs in June and 1,500 cfs in April and May;■ in wet years minimum flows should be 300-400 cfs except for 1,500 cfs from April through June.	<p>1. Develop a cooperative approach to coordinate flow releases to attain target levels.</p>
		<p>2. Provide the following 10 day spring flow events on the Stanislaus River: 2,500-3,000 in late April or early May in normal years, and 3,000-4,000 cfs in wet years. Such flows would be provided only when inflows to New Melones Reservoir are at these levels.</p>	<p>1. Develop a cooperative approach to coordinate flow releases to attain target levels.</p>

EAST SAN JOAQUIN BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		<p>3. Maintain the following baseflows in the Tuolumne River below Don Pedro Dam:</p> <ul style="list-style-type: none"> ■ in critical years flow release should be 50 cfs June-September, 80 cfs October-March, and 50-605 cfs in April-May; ■ in dry years flow release should be 75-cfs from June-September, 150 cfs October-March, and 170-985 in April-May; ■ in below normal years flow release should be 75 cfs from June-September, 200 cfs in first half of October, 175-1,075 cfs from mid-October through December, 175 cfs from January-March, and 210-1,428 cfs in April-May; ■ in above normal years flow release should be 150 cfs from June-September, 300-1,450 cfs from October-December, 300 cfs from January-March, and 500-2,500 cfs in April-May; and ■ in wet years flow releases should be 200 cfs from June through September, 300-1,450 cfs October-December, 300 cfs January-March, and 500-3,000 cfs in April-May. 	<p>1. Develop a cooperative approach to coordinate flow releases to attain target levels.</p>
		<p>4. Provide the following 10 day spring flow events on the Tuolumne River: 2,500-3,000 in late April or early May in dry years, 3,500-4,000 cfs in normal years, and 5,000-6,000 cfs in wet years. Such flows would be provided only when inflows to Don Pedro Reservoir are at these levels</p>	<p>1. Develop a cooperative approach to coordinate flow releases to attain target levels.</p>

EAST SAN JOAQUIN BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		<p>5. Maintain the following base flows in the Merced River below Lake McClure:</p> <ul style="list-style-type: none"> in dry years minimum instream flows at Shaffer Bridge should be 15 cfs from June to 15 October, 60 cfs from 16-31 October and January through May, and 75 cfs in November-December. and in normal years minimum instream flows at Shaffer Bridge should be 25 cfs from June to 15 October, 75 cfs from 16-31 October and January through May, and 100 cfs in November-December. 	Develop a cooperative approach to coordinate flow releases to attain target levels.
		6. Provide the following 10 day spring flow events on the Merced River :1,000-1,500 in late April or early May in dry years, 2,000-2,500 cfs in normal years, and 3,000-4,000 cfs in wet years. Such flows would be provided only when inflows to Lake McClure are at these levels.	1. Develop a cooperative approach to coordinate flow releases to attain target levels.
Stream Meander Belt		General Target: Develop a cooperative program, consistent with flood control requirements, to restore more natural channel configurations to reduce salmonid predator habitat and improve migration corridors.	<p>1. Work with permitting agencies to appropriately condition future gravel extraction permits. Coordinate the design and implementation of gravel pit isolation and stream channel configuration with the Corps, local water management agencies, and local governments.</p> <p>2. Develop a cooperative program with the counties, local agencies, and aggregate resource industry to develop and implement gravel management programs for each of the three rivers.</p> <p>3. Develop a cooperative program to implement a salmonid spawning and rearing habitat restoration program, including reconstruction of channel at selected sites by isolating or filling in in channel gravel extraction areas.</p>

EAST SAN JOAQUIN BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		1. On the Merced River between the towns of Cressey and Snelling, isolate gravel pits, reconfigure dredge tailings, and restore a more natural channel configuration to 5- 7 miles of disturbed stream channel.	
		2. On the Tuolumne River, between river miles 25 and 51, isolate 15-30 gravel pits, reconfigure dredge tailings, and restore a more natural stream channel to 6- 9 miles of disturbed stream channel.	
		3. On the Stanislaus River restore a more natural stream channel to 2.5 to 5 miles of disturbed stream channel.	
Gravel Recruitment		General Target: Restore gravel recruitment to levels necessary to support spawning habitat needs of restored levels of fall-run chinook salmon.	<p>1. Develop a cooperative approach with counties, local agencies and the aggregate resource industry to improve gravel recruitment.</p> <p>2. At selected sites, periodically add appropriately sized salmonid spawning gravel to spawning reaches on the lower Merced River.</p> <p>3. At selected sites, periodically add appropriately sized salmonid spawning gravel to spawning reaches on the lower Stanislaus River.</p> <p>4. At selected sites, periodically add appropriately sized salmonid spawning gravel to spawning reaches on the lower Tuolumne River.</p> <p>5. Protect all existing sources of gravel recruitment and enhance process through direct manipulation where possible and needed.</p>
Gravel Cleansing and Transport		General Target: Restore gravel transport and cleaning process to improve the quality of salmonid spawning gravel in each of the streams to the level necessary to support spawning of target levels of chinook salmon.	1. Develop a cooperative program to mechanically clean spawning gravel at selected sites on all three streams where armoring and sedimentation and vegetation encroachment are severe.

EAST SAN JOAQUIN BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Water Temperature		<p>General Target: Maintain maximum surface water temperatures on the lower Merced, Tuolumne, and Stanislaus rivers, to the downstream boundary of the salmon spawning area during the fall and winter and to the mouth of the river during the spring as follows:</p> <ul style="list-style-type: none"> ■ October 15 - February 15 56°F ■ April 1 - May 31 65°F 	<p>1. Develop a cooperative evaluation of the use of temperature control devices/reservoir management options to reduce water temperatures during critical periods.</p> <p>2. Evaluate the impact of irrigation returns on stream temperature.</p>
Land Use		<p>1. Balanced fine sediment input to the system with export maintaining fine sediment input in balance with transport from the system.</p>	
		<p>2. Develop a cooperative program to protect existing riparian habitat and improve degraded habitats where possible through land use actions.</p>	<p>1. Cooperatively evaluate the feasibility of constructing sediment retention basins to reduce fine sediment input.</p> <p>2. Encourage implementation of improved land management and livestock grazing practices along stream/riparian zones to reduce streambank erosion and sediment input.</p>
Exotic Species - (Fish and Wildlife)		<p>General Target: Reduce adverse effects of non-native fish species that have a significant effect on juvenile salmon production in the rivers.</p>	

EAST SAN JOAQUIN BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
Unscreened Diversions		General Target: Reduce entrainment of fish and other aquatic organisms into diversions to a level which will not impair restoration of salmon and steelhead. by 50%, by volume, in the basin.	<ol style="list-style-type: none"> 1. Improve the efficiency of five gravity riparian diversion screens on the lower Merced River. 2. Evaluate the feasibility of installing state-of-the-art screens on small pump agricultural diversions located along the three streams. 3. Provide alternative sources of water to diverters legally diverting water from spawning and rearing areas of the three streams. 4. Purchase water rights from diverters whose diversions entrain significant numbers of juvenile salmon or steelhead.
Fish Passage		1. Eliminate the loss of adult fall-run chinook salmon straying into the San Joaquin River upstream of the Merced River confluence.	1. Continue annual installation of a temporary weir on the San Joaquin River immediately upstream from the confluence with the Merced River to block adult salmon migration.
		2. Develop a cooperative program to eliminate blockage of upstream migrating fall-run chinook salmon and steelhead at temporary irrigation diversion dams erected during the irrigation season.	1. Evaluate the need to remove temporary diversion dams that block upstream passage of salmon and steelhead into spawning grounds of three streams.
Harvest of Fish and Wildlife		1. Reduce the loss of adult fall-run chinook salmon and steelhead to illegal harvest.	<ol style="list-style-type: none"> 1. Provide additional law enforcement to enforce harvest regulations. 2. Develop a cooperative program to increase public awareness of illegal harvest through education programs. 3. Provide means and incentives for reporting illegal harvest violations.
Artificial Production of Fish		1. Minimize the likelihood that hatchery reared salmon and steelhead could stray into adjacent non-natal streams rivers and streams in order to protect naturally produced salmon and steelhead.	1. Develop a cooperative program to evaluate the benefits of limiting stocking of Merced River Hatchery reared salmon and steelhead to the Merced River.

EAST SAN JOAQUIN BASIN ECOLOGICAL ZONE

Targets and Actions

Resource Element	Location	Target	Actions
		2. Employ methods to limit straying and loss of genetic integrity of wild and hatchery supported stocks.	1. Rear hatchery salmon and steelhead in hatcheries on natal streams to limit straying.. 2. Limit stocking of salmon and steelhead fry and smolts to natal watersheds to minimize straying that may compromise the genetic integrity of naturally producing populations.
Shaded Riverine Aquatic and Riparian Habitat		1. Restore a minimum of 15 stream miles of self-sustaining diverse riparian community along each river.	1. Develop a cooperative program to protect existing blocks of riparian vegetation. 2. Implement riparian restoration program. 3. Encourage implementation of improved land management and livestock grazing practices along stream/riparian zones.